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Telephony.

THE AMERICAN TELEPHONE JOURNAL

Comprising Telephony, American Telephone Journal, Sound Waves, Telephone Magazine, and The Telephone

PUBLISHED WEEKLY BY THE TELEPHONY PUBLISHING COMPANY, MONADNOCK BLOCK, CHICAGO

VOL. XVI. No. 15

CHICAGO, NOVEMBER 21, 1908

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1889 Paris Exposition Medal for Rubber Insulation — 1893 World's Fair Medal for Rubber Insulation

OKONITE TRADE MARK REG. U.S. PAT. OFFICE

THE STANDARD FOR RUBBER INSULATION

OKONITE WIRES, OKONITE TAPE, MANSON TAPE, CANDEE PAT'D POTHEADS

THE OKONITE CO., Ltd. Sole Manufacturers 253 Broadway, New York

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CLAY PRODUCT COMPANY

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GEO. NASH CO.

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STEEL SPECIALTIES

COLD ROLLED AND COLD DRAWN STEEL
NORWAY IRON — MUSIC WIRE — SPRING WIRES
DRILL RODS — TOOL STEEL — SPRING RIBBONS
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KERITE

Insulated Wires and Cables

1850 DAYS KERITE 1908

The Insulation which has withstood successfully the test of half a century

W. R. BRIXEY, Sole Manufacturer

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CHICAGO TELEPHONES SATISFY

CHICAGO TELEPHONE SUPPLY CO.

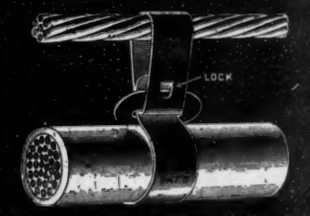
FACTORY AND GENERAL OFFICES

ELKHART, IND. U.S.A.

METROPOLITAN CABLE CLIP

Type "B"

The most efficient cable hanger for cables of moderate size on the market. Easily applied; durable and cheaper in the long run than marline hangers. Note the new locking device illustrated in the cut:



Manufactured in two sizes as follows:
7-in. size fits cable up to 1 in. diameter.
9-in. size fits cable from 1-in to 1½ in. diameter.
For larger cables, use our well known type "A" Metropolitan Cable Clip.
Manufactured by

YONKERS SPECIALTY COMPANY

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Telephone Pair a Specialty

DETROIT INSULATED WIRE CO.

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PLATINUM

Wire, Sheet, Rivets and Contacts

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TELEPHONE CABLE

WATERBURY CO., 69 SOUTH STREET, NEW YORK CITY

ALPHABETICAL INDEX TO ADVERTISEMENTS ON PAGE 19

1908-Lease Records-1909

Send for our "Newform." The best companies all use it, and reorder year after year.

Our **Improved Cash Book** is just out and going fast. The most valuable form yet devised for keeping detailed Telephone Accounts simply and accurately. Used and approved by best Telephone Accountants.

Our Books, Blanks and Forms for Telephone and Toll Line Accounting are "Standard" and used more than any other. Write for sample forms and prices.

THE TELEPHONE PRINTING COMPANY

DEFIANCE, OHIO

The Indiana Rubber & Insulated Wire Co.

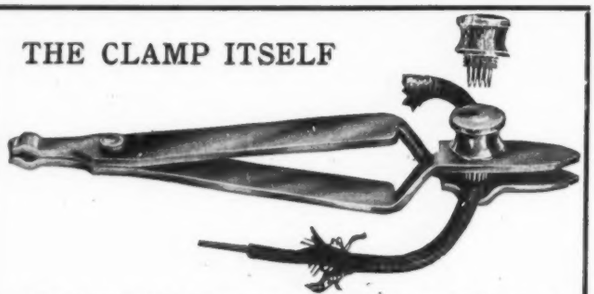
MANUFACTURERS OF

PARANITE TRADE MARA

Insulated Wires and Cables

JONESBORO, IND.

THE CLAMP ITSELF



The cut shows the clamp in operation, penetrating the insulation of a wire and making contact with conductor inside. The stud is shown separately to illustrate that it is removable and renewable. It will be noted that it is designed to screw into one jaw of the clamp. Should the points break or grow dull through constant use, additional studs may be had. Send 75c. for a set of two, postpaid. Your money back if you want it.

The Williams Test Clamp Co., 720 Electric Bldg., Cleveland, O.

Every Telephone Manager Should Read It

Bulletin Seventeen

AMPERAGE AS THE TEST OF A DRY CELL

Sent on Application

French Battery & Carbon Co. Madison, Wis.

A New Test Set

Anyone Can Operate

It will **locate** all your **troubles** on **toll, rural** and **local lines** in Switchboards, Instruments or Cables

Universal Quick Accurate Inexpensive

We will send set on trial or show you personally

ANYONE CAN OPERATE

Write now for information

Middleton Brothers

Electrical Testing Instruments. Monadnock Block, Chicago

The Sweetheart of the Storm

Chapman Lightning Arrester

Manufactured by

Minnesota Electric Co.

Minneapolis, Minn.

Selling Agent, H. E. COBB,
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TELEPHONE WIRE

Best by Every Test

A Difference in Wire makes a Difference in Service.

LONGEST LIFE—HIGHEST EFFICIENCY

Universities have tested our wire and found it of the highest quality. Leading Telephone Companies use it, with perfect satisfaction in most exacting service.

Write for Samples and Prices Today

Handled by Representative Jobbers and Supply Houses

INDIANA STEEL & WIRE COMPANY

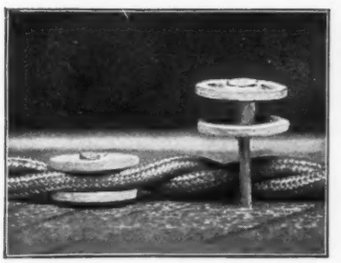
MUNCIE, INDIANA

Eureka Fibre Insulators

A NEW STYLE

"PRICES TO POINT, WHERE IT IS ECONOMY TO USE THEM"

The value is in the method that they are attached without injury to the wire.



Made in Three Types
50, 60, 70
¾", ⅞", and 1" long respectively.

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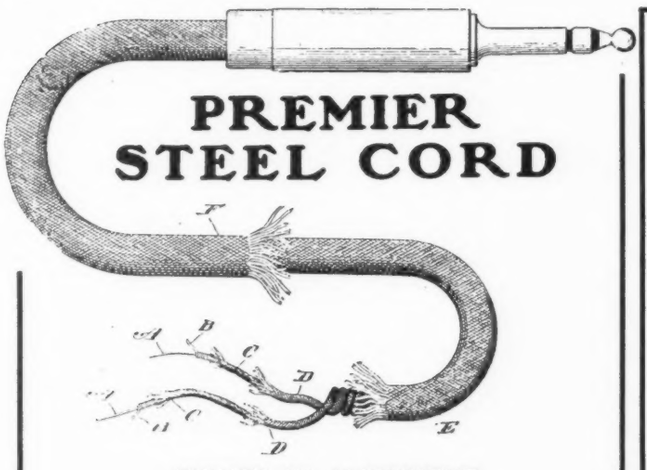


PREMIER STEEL CORD

ALWAYS IN ALIGNMENT

In the hollow of the cord at the plug end, there's a reinforcing spring made of the highest grade spring steel. Not only does this prevent the conductors from being thrown out of alignment, but it also makes it practically impossible to break the cord at the plug end, and that's where the strain is greatest. Operators don't have to be careful when you use Premier Steel Cord—it'll last in spite of shamefully careless usage. Better get details.

Runzel-Lenz Electric Mfg. Co.
97-101 South Clinton Street, Chicago

Five Men on a 95 cent PEIRCE SEAT

We make six designs of seats, three all steel and three with wood seats.

Get circulars.

Peirce Specialty Co.
ELKHART, IND.

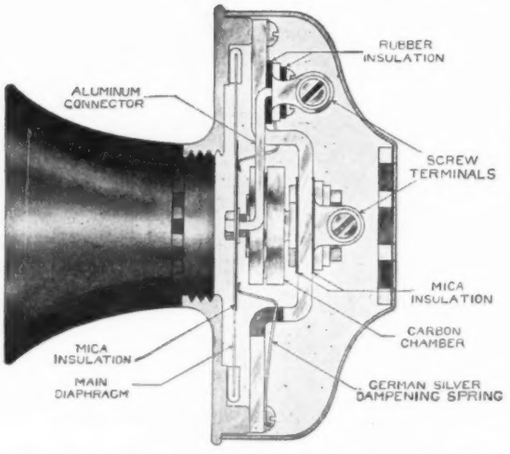
We Have no Cause to Worry About Our Transmitter

THAT IS WHY

Other Makes do not Worry Us

Cracraft Leich Transmitters have been a success from the time they were first manufactured.

They are the same now as they were in the beginning.



Cracraft Leich Transmitters are always alive when the receiver is removed from the hook. The secret lies in the Carbon Chamber and its contents.

WRITE FOR ADVANCE BULLETIN, NOVEMBER 1908

CRACRAFT LEICH ELECTRIC CO.

GENOA, ILLINOIS

Our "Jolly Good Fellow"

Continues to be in great demand

MERIT

POPULARITY

Open View No. 50

Answer:—STANDARD instruments are made from the best of raw material by the most expert workmen obtainable according to the designs of highly competent engineers. Are you getting satisfaction? The best Magneto telephone is spelled STANDARD.

The Standard Telephone Mfg. Co.

Portsmouth, Ohio

Successors to The Williams Telephone & Supply Co., Cleveland, Ohio.

If You Consider THE POOLE Lock-Out System

as an addition to party-line service, you are wrong. It is not something added—it is a feature which has always belonged to good service. It unfailingly gives absolute

SECRECY

to any of the parties on the line. It gives the subscriber all the advantages of a private line at the cost of a party line. It enables you to put more parties on a line, and get higher rates.

Now, do you want details?

Mountain State Electrical Co.,

Wheeling, W. Va.

150-Line Unit Type Magneto Switchboard

EQUIPPED WITH

No. 8 Self-Restoring Gravity Drops

¶ It will pay you well to take a keen interest in the numberless LASTING and ECONOMICAL FEATURES of Quality Apparatus—especially in this form of MAGNETO SWITCHBOARD. Besides being a well designed switchboard cabinet, of well-seasoned kiln dried Golden Oak, of our own selection, the arrangement of all apparatus is such as to provide the greatest accessibility and an ultimate capacity of equipment in the least cabinet space.

¶ Take up every point in the construction of this Magneto Switchboard—then get our latest prices on a switchboard of this type, equipped to meet your requirements.

¶ If there is any further information YOU desire, we want YOU to call on us and assure YOU of our best interest in YOUR behalf AT ALL TIMES

No. 5A—Operator's Transmitter Arm—An adjustable extension arm made of seamless brass tubing—highly nickel-plated and constructed rigidly—equipped with two **No. 10—5-foot Transmitter Cords** and **No. 1 Cord Weights.**

No. 34 Escutcheons—When the equipment ordered partially equips the switchboard panel the unequipped space is filled in with blank metal escutcheons as illustrated. These are instantly removable.

No. 8 Self-restoring Gravity Drop—The ingenious feature of all our Magneto Switchboards. A gravity drop that consists of few well-designed parts—positive action and is sensitive and reliable. **Ask for further particulars and booklet.**

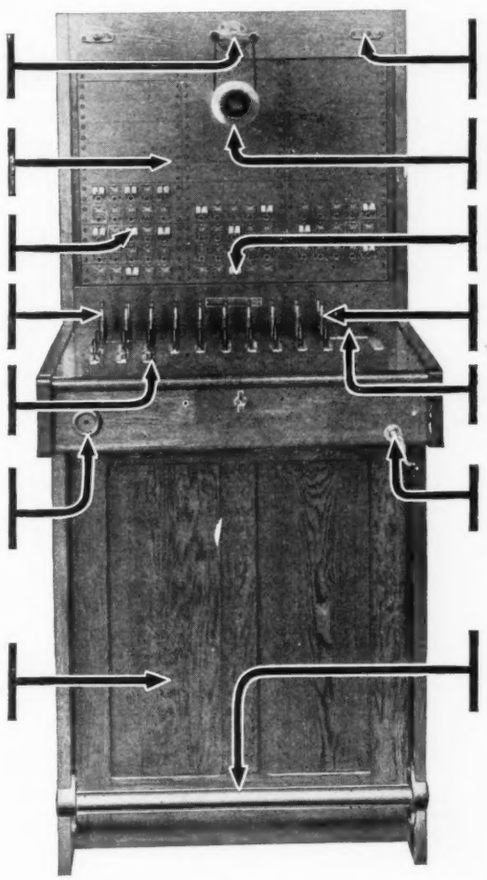
No. 36—Plug and No. 78—6-ft. Cord—The rear plug of the cord pair is known as the answering plug. No. 2 Cord Weights are furnished with each cord. The cords in these switchboards never give trouble and will outwear all other makes.

No. 30—Key—The ringing and listening keys are of the vertical type. There are no floating contacts in these keys and ample insulation is provided.

No. 58—Operator's Jack—This part of our operator's equipment is a carefully insulated piece of apparatus. The complete equipment consists of this jack, a No. 15A Receiver and No. 87—6-ft. Cord with No. 40 Plug attached.

No. A5360—Switchboard Cabinet—All our switchboard cabinets are made in our own factory. The general dimensions of this cabinet afford an operator easy access for a greater number of jacks or subscribers' lines than any other board of the same capacity. Write for further particulars and booklet.

No. 152—Key mounted in this cabinet eliminates clearing out drops.



No. A 5360—150-Line Switchboard Cabinet.

No. 28 Key—The key located on the top panel in the right-hand side is the Generator Switch. The **No. 21 Key** located in the left-hand side is the Night Bell Switch.

No. 8B — Operator's Transmitter—Identically the same interior construction as our No. 7 Transmitter. A leading product producing the maximum volume of voice transmission with excellent articulation. Does not pack—absolutely moisture proof.

No. 9—Clearing-Out Drop—These drops are mounted five per strip the same as Line Drops. Our new No. 152 Key combining the clearing-out drop and ringing and listening key may be furnished when specified.

No. 36—Plug and No. 78—6-ft. Cord—The front plug of the cord pair is known as the calling plug. We have been making plugs for a good many years and know how to make a plug that does not become disassembled in operation.

No. 1—Plug Hole Stops—The key-shelf is drilled for an ultimate of twelve pairs of cords. All unequipped pairs are provided with these removable bushings made of hard rubber.

No. 57—Generator—The high voltage output of our generators and their greater permeability make them the preferred article for dependable ringing service. A special crank handle and shaft is provided with this generator.

No. 9—Foot Rail Bracket—Furnished with this type of cabinet, including 1¾-inch seamless polished brass rail. This additional feature for a Magneto Switchboard will be found convenient and particularly characteristic of the best designed Magneto Switchboard.

No. 152 Key is a combination ringing and listening key and clearing out signal.

We will accept YOUR order for immediate delivery IF you will accept OUR standards. You are taking no chances.

IF YOU CAN NOT ORDER TO-DAY, AT LEAST ASK FOR PRICES.

See our exhibit, Auditorium Hotel, Chicago, Rooms No. 642-644.

International Independent Telephone Association Convention, Dec. 1-2-3, 1908.

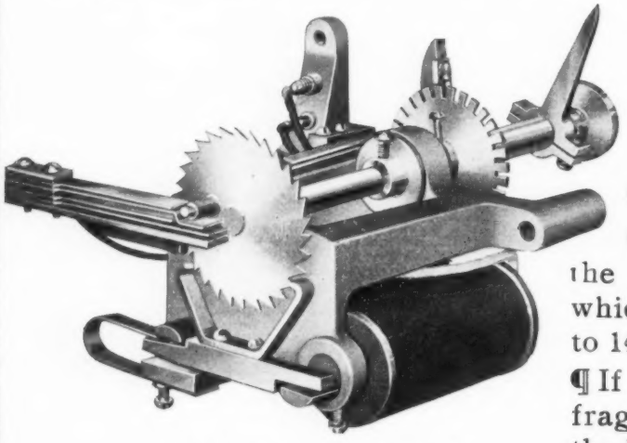
STROMBERG-CARLSON TEL.MFG.CO

ROCHESTER, NEW YORK, U.S.A.

CHICAGO, ILL. KANSAS CITY, MO.

¶ NO! NO! This is no part of our lock-out telephone set.

¶ The device illustrated herewith, is simply the Impulse Counter at Central, its function being to measure out and send to line a predetermined number of selecting impulses.



IMPULSE COUNTER

The first and only device to count and measure out impulses from an outside source.

Absolutely Accurate and Reliable

¶ The device is operated by a single motion of a single key, ringing current being sent to line automatically after the delivery of the required number of selecting impulses.

¶ There are no make and break contacts on the device itself, the impulses being delivered to the counter by an ordinary pole-changer.

¶ The frequency of the impulses is the same as that of the pole-changer, which we usually operate at a speed of 12 to 14 cycles per second.

¶ If you want to know how we prevent fragmentary impulses from escaping to the line, write for Bulletins.

HOMER ROBERTS TELEPHONE CO.

1703 Melrose Street, Chicago, Ill.

See Our Exhibit Rooms, 600-606 Auditorium, Dec. 1, 2, 3.

CIRCULAR LOOM

IN YOUR STORAGE BATTERY ROOM

AMERICAN CIRCULAR LOOM CO.
TRADE MARK REGISTERED

Use Circular Loom for protecting and insulating your battery leads. Place Circular Loom around metal pipes running above the cells to protect them from fumes and to keep metal particles from falling off into the battery. It's neater and better than the ordinary boxing.

You'll find new Circular Loom uses for every day.

Order from your dealer or address

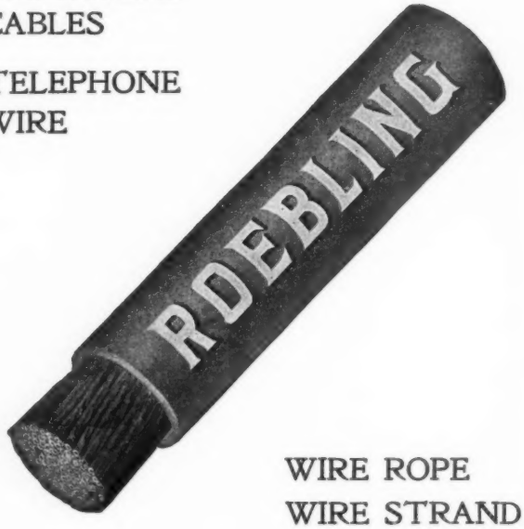
AMERICAN CIRCULAR LOOM CO.

BOSTON, MASS.

NEW YORK CHICAGO SAN FRANCISCO

TELEPHONE CABLES

TELEPHONE WIRE



WIRE ROPE
WIRE STRAND

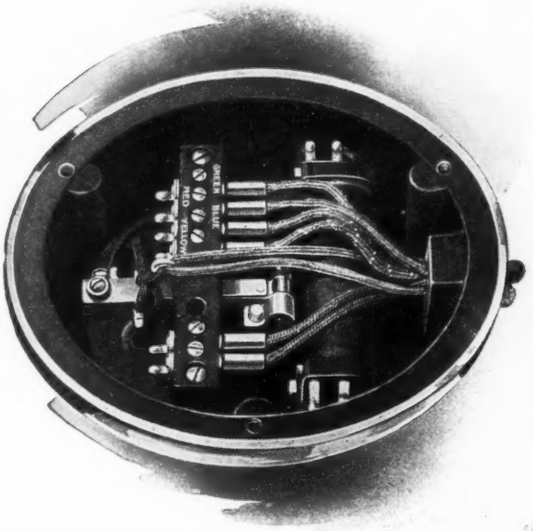
JOHN A. ROEBLING'S SONS CO.

TRENTON, N. J.

TWO GOOD PLACES

FOR THE INDUCTION COIL

IN MONARCH DESK SETS



¶ One is in the base of the desk stand in a convenient location where it can be removed by loosening two nuts. The contact springs and connecting rack can be reached just as easily.

¶ Another convenient place is in this box, which contains, besides the coil, the connecting rack, the ringer and the batteries. Notice how the batteries are out of the way yet can easily be reached.

¶ In both the above arrangements you will observe how all the parts are accessible—a feature which is in evidence in every piece of apparatus the Monarch Company produces.

Let Us Send You a Catalogue

MONARCH TELEPHONE MANUFACTURING CO.

Factory and General Offices: Washington and Morgan Streets, Chicago, Ill.

Branch House: 177 Main Street, Dallas, Texas

New Bulletin No. 26 Just Out

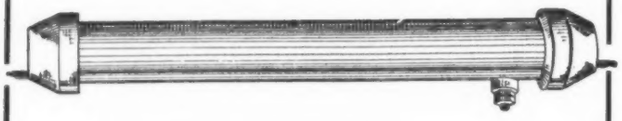
Showing Our
"PRIMO"
SWITCHBOARDS
MAILED FREE
Write To-day

Central Telephone and Electric Co.

St. Louis—Dallas

Makers of High Grade Telephone Apparatus

DESIGNED BY PRACTICAL MEN

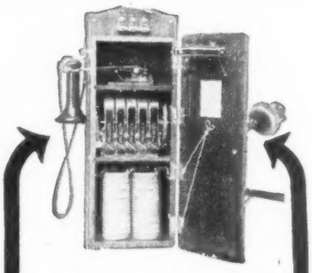


The Sky Rocket Arrester

Made for practical work, and they do it right. Their mission is to protect your lines from charges of excessive potential whether due to lightning or other causes, and they fulfill this mission invariably and infallibly.
Details, prices and references await your inquiry.

CHANCE MANUFACTURING CO.

CENTRALIA, MO., U. S. A.



If You're from Missouri We're from Milwaukee

and can certainly show you a saving in your repair charges by sending you a couple of Andrae Special Heavy Giant bridging telephones to put on your rural lines.

The difference between the "ANDRAE GIANT" and other telephones lies in the grade of material and workmanship used in their construction and to this is due the fact that they will out wear all other instruments, require less attention and cut repair charges to practically nothing.

Give us a chance to show you.

Julius Andrae & Sons Co.
48 Years at
MILWAUKEE

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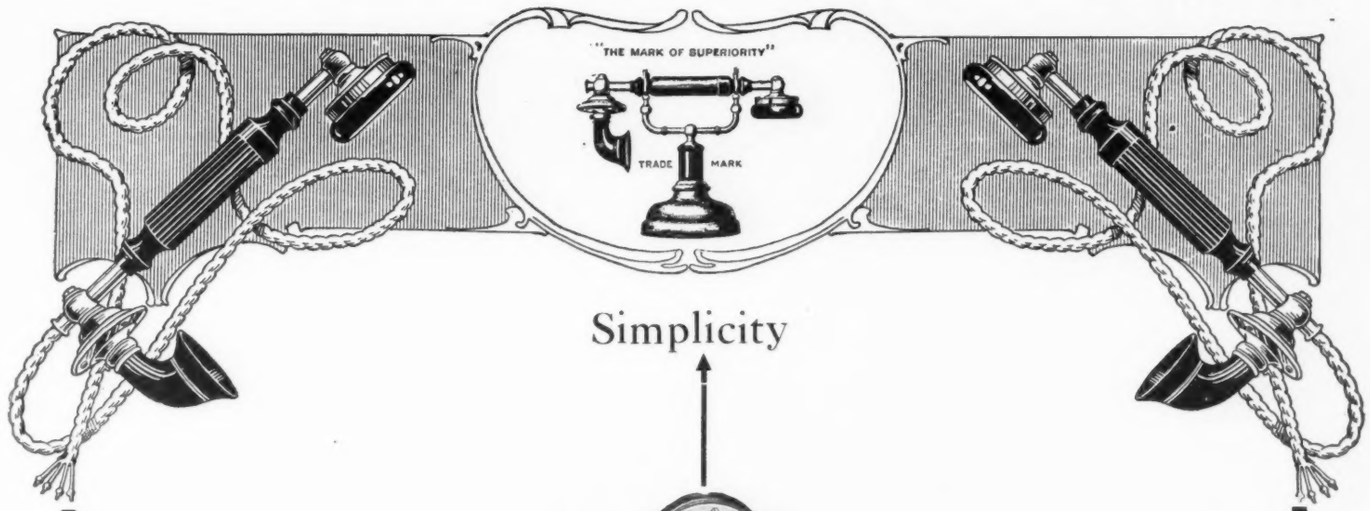

Simplicity

Accessibility ← → Efficiency

Durability ← → Reliability

Economy ← → Satisfactory

ERICSSON

We are the only Telephone Manufacturing Company making a complete line of

ALL STEEL TELEPHONES

You should know about it. Write for Catalogue and Booklet B

L. M. ERICSSON TEL. MFG. CO.
BUFFALO, N. Y.

Please tell the Advertiser you saw his Announcement in TELEPHONY.

When the time limit is short use

Orangeburg Fibre Conduit

Owing to the simplicity of the connections, the greater length of the sections, the extreme lightness—installations of ORANGEBURG FIBRE CONDUIT can be completed in about one-half the time required to install other forms of conduit.

Made in Socket-joint, Screw-joint and Sleeve-joint types, all of which fit accurately and with perfect alignment. Mandrels and dowel pins are unnecessary.

The length—5 feet—of the sections makes fewer joints and adds to the rapidity with which the work can be pushed. It is usual for one gang (two layers and three helpers) to lay 12,000 duct feet per day.

ORANGEBURG FIBRE CONDUIT is highly insulated, eliminating hysteresis losses; has smooth bore that can not injure cable sheathing; is durable, and reduces breakage loss to a minimum.

"The Conduit Book"—mailed on request—explains all these and the many other advantages of ORANGEBURG FIBRE CONDUIT. Write for it.

The Fibre Conduit Company

Main Office and Works: Orangeburg, N. Y.

Chicago Office: 1741 Monadnock Building.

Pierson, Roeding & Co. { San Francisco, Cal. / Los Angeles, Cal. / Seattle, Washington.

McClary-Jemison Machinery Co., Birmingham, Ala.

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Send "strong stuff"; secure suitable space. We will **prepare a striking display** and **give you a good position.** This will be the logical time to "Start something."

The long period of inactivity is ending. Awaken now to the call for a new era of prosperity.

The International Telephone Convention

will meet at the Auditorium Hotel, Chicago, December 1, 2, 3, 1908.

TWO ELABORATE, HANDSOMELY ILLUSTRATED EDITIONS OF

Telephony. THE AMERICAN TELEPHONE JOURNAL

will be issued on November 28 and December 5, immediately preceding and directly following this important gathering. These two issues will reach all of the desirable buyers of the field at a time when they are in a receptive mood---their minds fixed on new goods and modern methods.

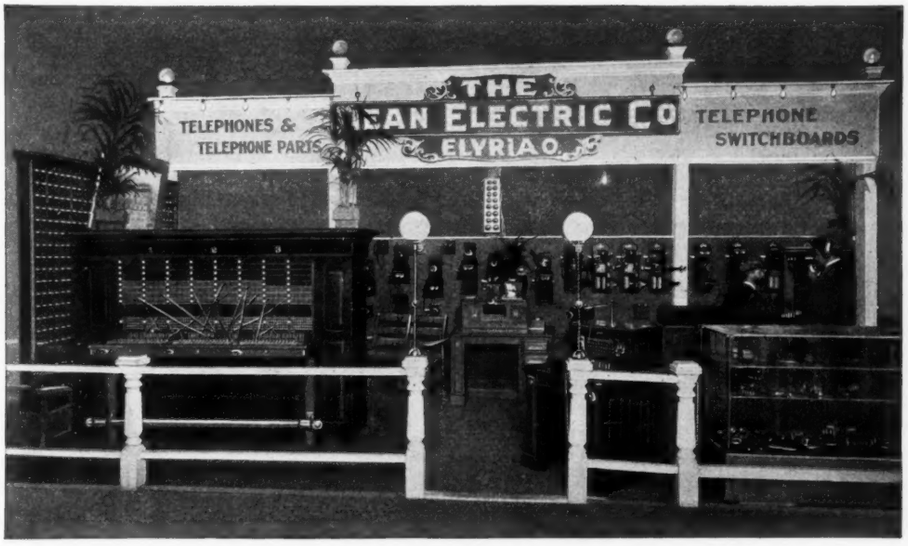
IT IS THE TIME FOR YOU TO ACT IF YOU SEEK THE BEST RESULTS

Address

Telephony Publishing Co.

Monadnock Blk., Chicago, Ill.

Convention Exhibits



Every Independent telephone operator should be familiar with the best Independent apparatus—Dean equipment.

The Dean Exhibit is always the principal point of interest at the telephone convention.

Our 1907 Exhibit, as illustrated above, is typical of our efforts to show such details as are of vital importance to any telephone buyer.

This Year, Dec. 1, 2, 3, 1908, at the Auditorium Hotel, we will occupy Rooms 638-640.

The 1908 Convention is sure to be generously attended and we have prepared an exhibit that is worth your careful investigation.

Limited Space makes it impossible to show large switchboard sections, but we will have a complete line of telephones and parts, together with several private branch exchanges.

Technical Details, of such as

The Indestructible Desk Set

will be exhibited so as to show, in a simple manner, each working function.

Interchangeable Parts. of our Steel and Wood Wall Sets and our Desk Sets, will be shown, so that you can shift them from one instrument to another.

A Hundred Other points, too numerous to describe, will be explained to you by a staff of competent representatives.

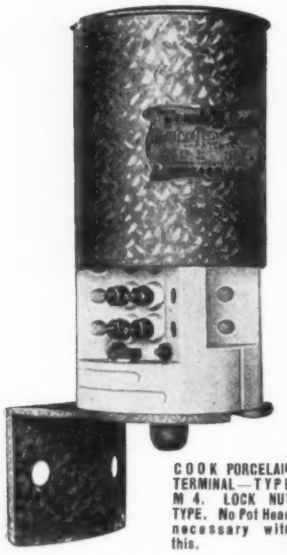
THE DEAN ELECTRIC COMPANY

San Francisco **Elyria, Ohio, U. S. A.** **Kansas City**

Cook Terminals and Junction Box

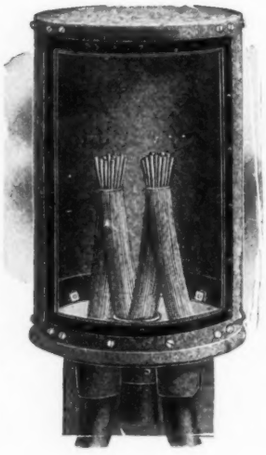
THE EMBODIMENT OF THE "QUALITY-NOT-QUANTITY" PRINCIPLE.

FOR TELEPHONE MEN WHO WANT THE BEST AND KNOW IT WHEN THEY SEE IT.



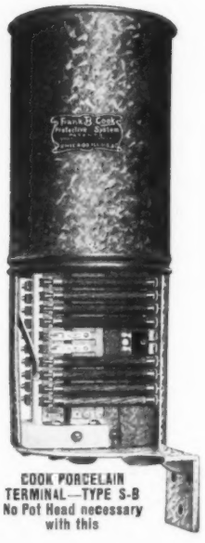
COOK PORCELAIN TERMINAL—TYPE M 4. LOCK NUT TYPE. No Pot Head necessary with this.

Their use reduces the cost of both installation and of maintenance



COOK SHEET STEEL JUNCTION BOX

Designed and built by experienced telephone men



COOK PORCELAIN TERMINAL—TYPE S-B No Pot Head necessary with this

Frank B. Cook

MANUFACTURER of TELEPHONE PROTECTIVE APPARATUS

CHICAGO ILLINOIS

242 WEST LAKE STREET

THE WESTINGHOUSE STORAGE BATTERY

Ask for Catalog 256-J

The Westinghouse Machine Company

Storage Battery Department

East Pittsburg, Pa.

HELLO!

Want a "Trouble" Wagon?

LISTEN—

This wagon made 616 miles during 20 days—No delays — No trouble—Oil cost $8.67—Repairs 70 cents--Saved one man's time and reduced livery expenses 70%. You can't afford to be without one. Write today. A few details—double cylinder, opposed, 4 cycle, air cooled, planetary transmission, chain drive, 16 H. P., wheel steer, solid rubber tires. Always ready—no hitching or unhitching—good in all weather on all roads summer and Winter—a great hill climber. **Write today for Catalogue 100**

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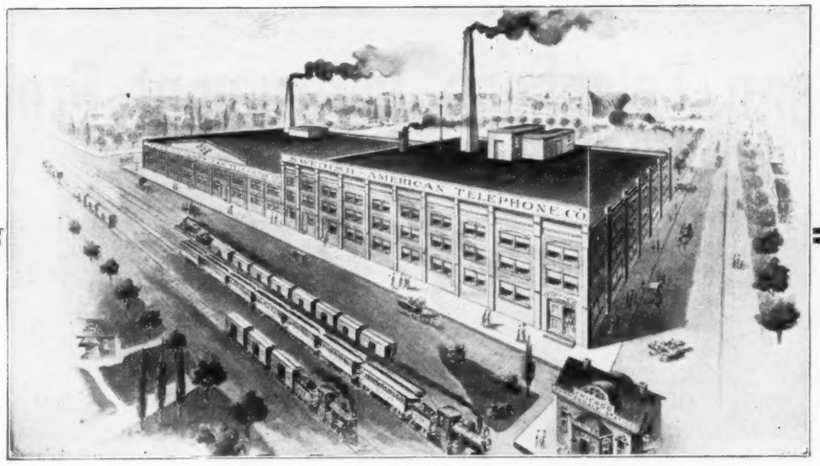

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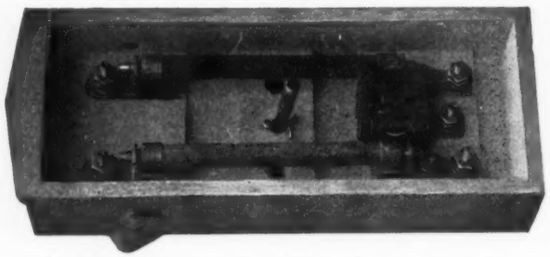

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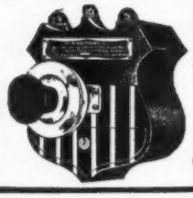

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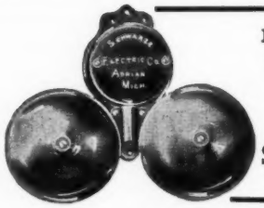

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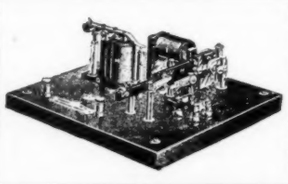

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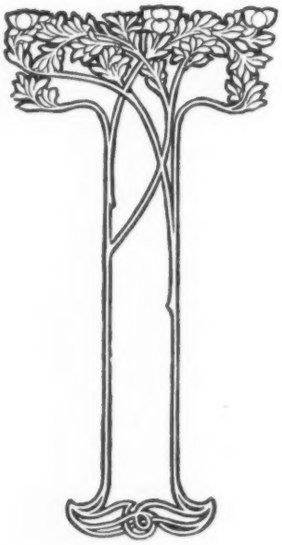

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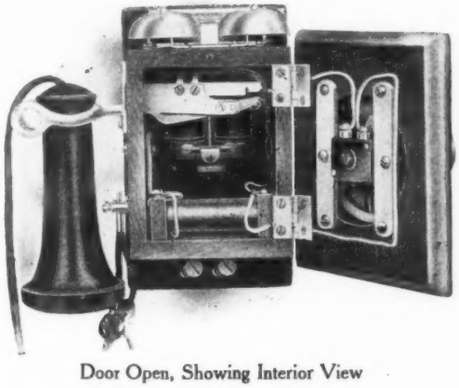

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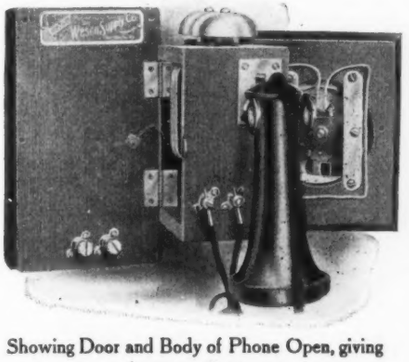

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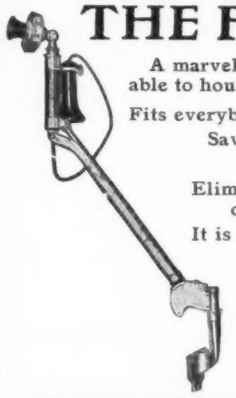

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Telephony.

THE AMERICAN TELEPHONE JOURNAL

Comprising Telephony, American Telephone Journal, Sound Waves, Telephone Magazine and The Telephone

Vol. XVI | CHICAGO, SATURDAY, NOVEMBER 21, 1908 | No. 15

PUBLISHED EVERY SATURDAY BY THE

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CHICAGO, SATURDAY, NOVEMBER 21, 1908.

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The Best Convention.

Ten days from now, telephone men from all over the country will be joining in the proceedings of the greatest convention that the Independents have ever seen. The informal program shows what may be expected. The speakers are recognized as constituting the ablest group of men who can be gathered to represent the Independent telephone industry, and every side of the business will receive its share of attention. Opportunities for a general interchange of ideas on practical subjects have been carefully provided for, and every man may take an active part.

The investor will have opportunities to get in touch with the men who are building great Independent telephone systems throughout the country. He will learn the national scope of the Independent movement, and become aware of the strength and enthusiasm of the leaders who are carrying on a business which, alone, of all the undertakings in the country, has been able to show steady increases of earnings through the dull period which has just closed.

The president of the telephone company will learn how other people handle the business, from men whose reputation for success is of the highest. The manager will obtain, at the practical and technical conferences, ideas worth many times the expense of the trip to Chicago, if he will apply them when he gets back to his work at home.

Like all good managers, the officials in charge of the program have a few surprises in store for those who attend. And it is violating no secret to say that these will be intensely interesting and important to every man connected with the industry. Any person who can go to this convention and not realize what Independent telephony means, the bigness and the power of the telephone business, ought not to be a telephone man.

We are usually a bit shy of prophecy, but, after learning the plans for this great meeting, we are so enthusiastic that we are willing to go on record with the prediction that any man who attends will say he has received better returns upon his time and money than from any other trip he has ever taken. So, pass the word along! Let the president come and bring his friends—bring the directors—and the manager and the engineer. You will all learn something that will do you good and be worth your while.

Business Probabilities.

The uncertainty that invariably precedes a presidential election, causing capital to "wait and see," being now over, business men generally anticipate a decided improvement in conditions. Doubters, who do not understand how a real improvement could take place in a single week, can see the figures showing large orders for equipment placed by the great industrial corporations and some of our leading railways, and the feeling of courage created by such evidence as this will soon spread all over the country.

A careful study of the few weeks just before the election shows that there was, even two months ago, a very considerable sentiment in favor of a greater activity in trade. This was influenced not only by the certainty of ample crops, but by the prospect of an increasing demand for all commodities, arising in various sources. Noteworthy figures are those of the U. S. government reports, showing increases in the importations of manufacturers' material ranging from 25 to 60% above the figures for September, 1907. Of still greater significance to the telephone field, perhaps, are the figures for the importations of pig copper, of which there was brought in in September, 1907, 13,426,000 lbs., valued at $3,371,000, while in September, 1907, there were brought in 16,748,000 lbs., valued at but $2,271,000. These are many specially valid reasons for predicting a prosperous and active year in the telephone business. Extensions and renewals have been delayed and work must soon be taken up at sufficient speed to make up for these past delays. Not only has there been an actual demand for service which has not been filled, but the slowing down of general business has held back the natural demand, which will soon become evident.

Why should not the telephone industry reap its full share of this renewal of business prosperity? It will, of course, and the prophets who predict record breaking development in the next four years have reason for their claims. Everybody in the field should do his part to start the ball rolling and help restore the reign of prosperity. Send in that order you have been holding back, and do your share to start things quickly! If there were ever a time when it pays to be optimistic it is the present. Prices on all material are very low. In fact, in most lines they are not only below normal, but far below the proper level, owing to the belief that such low figures will stimulate demand. The early orders are the ones which will get the good quotations.

Reliability—How Much Is It Worth?

The term itself, reliability, is one which is capable of a wide variation in meaning. Just what constitutes a reliable thing depends what we are accustomed to expect of it. None of us expects the roof of his house to fall down on him in a high wind, but our ancestors, away back in the beginning of things, doubtless took it as a matter of course that their frail dwellings would now and then blow over. Partly because we have learned the art of substantial building and partly because our expectations are higher, we now demand and get practically perfect reliability in this work.

The art of making telephones has advanced steadily since its invention, until now the instrument is rated as a very dependable thing. The best telephone instruments and systems are called "reliable." Yet this application of the term does not mean anything like the degree of reliability which we expect in a building.

Every good manager desires to make his telephone service just as reliable as possible, not to let it get as bad as the people will stand. Yet it is often a question as to how far he should go in taking steps to secure reliability. Lack of what the public expects in this line has often caused severe censure of the company and its methods. One man complained bitterly that the telephone was always out of order just when he needed it most—after severe storms. At such times the line was often grounded in the arresters, or open in the fuses, or something else.

Reliability, in the strict meaning of the word, costs money. People can have as much of it as they are willing to pay for. It is very largely a matter of how much they value it. It is true that some parts of telephone apparatus fail more often than we believe necessary, yet most of it is now so reliable as not to prevent service being rendered except in extreme cases. The monthly inspection of all subscribers' instruments used to be regarded as necessary, and lived up to as far as possible. But the introduction of common battery, and the steel cord, the perfection of the transmitter, receiver, and hook-switch together with other important details have made apparatus so reliable as to cause almost all companies to abandon the regular monthly inspection, taking care of trouble only when it appears. Doubtless the number of reported troubles could still be reduced if the monthly inspection were to be continued, but the number of troubles prevented would be too small to justify the expense. In other words, the increased reliability of the service would cost more than people would be willing to pay for.

The practical limits under which we have to work are usually placed by the existing rates. The manager tries to give as good service as he can and still pay dividends. He is between the public, demanding reliability in service, and the stockholders asking for returns on their money. He may count himself successful if he can satisfy both. He will find his safest course in spending money only for apparatus and construction which is permanent and durable. This will nearly always cost more than the policy of buying the cheapest things on the market, but the saving in maintenance will offset the higher investment, so that the increased reliability has cost little or nothing. The company will also have the good will of its patrons, which is a valuable asset.

Winter is here. Wires are tightening up and singing with the cold. Guys and poles are being tested by the changes in the weather. The man who has followed the cheap policy is wondering how many breaks in the service he will have before spring. The man who has put good design, good material, and good apparatus into his plant knows that he will have some trouble, but is not worrying about it, for he is on the safe side. The reliability is worth paying for, for it is a saving in the end.

Telephone Use in Government Dam Construction at Louisville, Kentucky

By Vincent E. Furnas

Where an expensive force of men, using heavy machinery is engaged upon work somewhat remote from a base of supplies, much time and money can be saved by providing means of communication which are as near perfect as can be devised. This has been amply demonstrated by the experience of officers of the U. S. government, who are at present engaged in building a large dam across the Ohio river at Louisville, Ky. They find the telephone indispensable in their work upon a project which presents certain difficulties of a character which, although making it far from easy to provide telephone service, causes a line, once established, to be a most important factor in the satisfactory progress of the work.

At Louisville there is a low water-fall. In times when the river is running high, shipping can pass over this fall through the Indiana Chute which imposes no obstacles to the progress of moderate sized boats down the river, by the city. This passage not being available, however, during seasons of low water, there has been used for a number of years a canal equipped with locks at the necessary intervals. Although the construction of this canal was completed several years ago, at a cost of several million dollars, and it has been altered and added to from time to time to facilitate the passage of shipping, still there is lost each year, in taking boats through this artificial waterway, time representing a very considerable value.

Telephone Line Along the Dam, Connecting the Construction Engineers with Louisville.

Great quantities of coal are shipped from Pittsburg to all points south by this river, and considerable time is necessarily lost in the breaking up of tows for the canal. Not only is the direct effect of this delay experienced, but the annoyance is much augmented on occasions when it is found that in passing through the lock a tow loses the advantage of a brief period of high water. It is no uncommon experience at certain seasons of the year, for a tow to come down as far as the upper entrance of the canal on a small rise, and, after passing through the locks and making up the barges at the foot of the canal, to find that the rise has passed, and that it must wait for the next one.

The work now in progress is the building of a series of dams from the head of the canal to the Indiana Chute, and from the north side of the chute to the Indiana shore, which will raise the water through the chute, thus permitting barges to pass through at a much lower stage than formerly.

This work can only be undertaken while the river is very low, and then continued with the greatest expedition until completed. Last year no work could be done at all on account of the unfavorable water conditions, but it is predicted that the work will be completed this fall, owing to the extremely low stage of the river.

With the base of supplies so far from the work, the engineers in charge have found that the use of the telephone is a great time saver, and have installed one in the houseboat of the assistant engineer, located at the point where the dam is being constructed. This line connects with the local exchange of the Home Telephone Company in Louisville. During the winter, the telephone is located in Shippingport, but at the time of low water the line is extended east along the old dam, then north, to the houseboat.

In the construction of the line, twenty-foot poles are used, equipped with two pin cross-arms. The poles are set in the bottom of the river, stones being piled around them to help withstand the current. The line extends for a distance of a mile and a half on these poles, and presents a rather peculiar appearance, standing out bold and clear above the water.

The maintenance of this line presents a rather unusual condition, as the only way to reach the line is by boat. But, as the wires are well removed from small boys and other trouble makers, there have been few interruptions of service. At the terminus, the drop is connected to the houseboat over a drum, which can be adjusted to keep the line clear at all times, and compensate for any movement of the boat which might tend to break the connection. The engineers in charge of work on the dam say that the telephone has been a great help in the handling of details of the job. In fact, they call it indispensable, as supplies can quickly be obtained only through its use.

Wave Distortion in the Carbon Transmitter

By Bruce V. Hill

It is the purpose of the present note to develop the mathematical theory of the transmitter and show how the conclusions obtained are upheld by common experience with the transmitter.

Let us assume an ideal transmitter. By this is meant a transmitter in which the diaphragm is perfectly elastic, following exactly the impulses impressed upon it, and in which the carbon granules are also perfectly elastic for the range of deformations to which they are subjected and the resistance of which varies, through this small range, inversely as the pressure to which the granules are subjected. If, with these assumptions we find the sound wave falling upon the diaphragm to be distorted, it will be still more distorted by the actual, imperfect transmitter.

Next assume that a simple sinusoidal sound wave falls upon the diaphragm. Such a wave is given off by a good tuning fork. It is shown in the symmetrical curves of Figs. 3 and 4 and is represented by the equation

$$y = a \sin 2\pi ft. \qquad (1).$$

If the wave were not simple, but compound, it would be represented by the equation,

$$y = a_1 \sin 2\pi f (t - t_1) + a_2 \sin 4\pi f (t - t_2) + \text{etc.} \qquad (2).$$

Here we may consider each partial tone by itself, and whatever distortion has effect upon one component of the wave will produce an effect upon every component.

Every vowel has its characteristic tone or series of tones which belong to it, by whatever voice, or in whatever pitch it

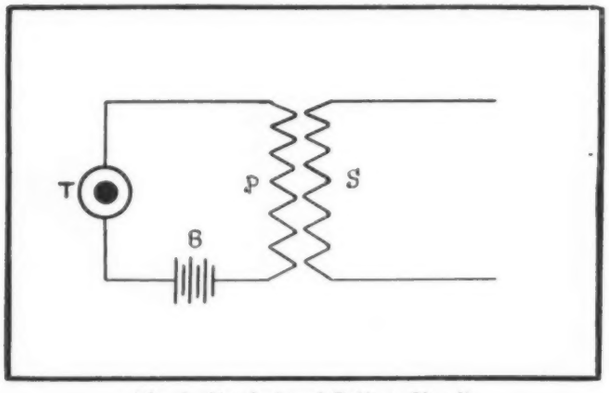

Fig. 1—Simple Local Battery Circuit.

is spoken. Thus, when the vowel *"U"* (=*oo*) is sounded the prominent musical tone is *f*, the *f* below *"middle c;"* for the vowel long "O," we have *b'*, and so on. A distortion of the wave will modify the vowels and render the speech less distinct. It is the purpose here merely to consider the effect of the transmitter. The inductances and capacities in the circuit may have a much greater effect than the transmitter, but a consideration of these is beyond the purpose of this article.

In order to have the simplest possible case, take that of a local battery circuit like that shown in Fig. 1. Let the total resistance of the primary circuit, when the transmitter is at rest, be R. When a simple sinusoidal sound wave falls upon the diaphragm the resistance of the primary circuit will be, under the assumptions made above.

$$R (1 + a \sin 2\pi ft)$$

where a is the amplitude of the vibration (in this case the maximum amount in percent by which the resistance of the primary circuit changes), and f is the frequency of the wave or the number of complete vibrations per second. Let the inductance of this circuit be L and the e. m. f. of the battery be represented by E. Then, by an extension of Ohm's law, we have

$$L\frac{dI}{dt} - IR (1 + a \sin 2\pi ft) = E \qquad (3).$$

Writing $\omega = 2\pi f$ and, dividing by L there is obtained

$$\frac{dI}{dt} - \frac{R}{L} I (1 + a \sin \omega t) = \frac{E}{L} \qquad (4).$$

The integrating factor is:

$$e^{\frac{R}{L}\int (1 + a \sin \omega t)\, dt} = e^{\frac{R}{L}(t - \frac{a}{\omega}\cos \omega t)}$$

Multiplying both sides of the equation (4) by this expression:

$$\frac{dI}{dt} e^{\frac{R}{L}(t - \frac{a}{\omega}\cos \omega t)} + \frac{R}{L} I (1 + a \sin \omega t) e^{\frac{R}{L}(t - \frac{a}{\omega}\cos \omega t)} = \frac{E}{L} e^{\frac{R}{L}(t - \frac{a}{\omega}\cos \omega t)} \qquad (5).$$

Integrating:

$$Ie^{\frac{R}{L}(t - \frac{a}{\omega}\cos \omega t)} = \frac{E}{L}\int e^{\frac{R}{L}(t - \frac{a}{\omega}\cos \omega t)} dt + K \qquad (6).$$

Developing the right-hand member by Maclaurin's Theorem, we have:

$$Ie^{\frac{R}{L}(t - \frac{a}{\omega}\cos \omega t)} = \frac{E}{L}\int \left[1 + \frac{R}{L}(t - \frac{a}{\omega}\cos \omega t) + \frac{R^2}{2L^2}(t^2 - \frac{2at\cos \omega t}{\omega} + \frac{a^2}{\omega^2}\cos^2 \omega t) + \ldots.\right] dt + K \qquad (7).$$

Which, integrated, gives:

$$Ie^{\frac{R}{L}(t - \frac{a}{\omega}\cos \omega t)} = \frac{E}{L}\left[t + \frac{R}{L}\left(\frac{t^2}{2} - \frac{a}{\omega^2}\sin \omega t\right) + \frac{R^2}{2L^2}\left(\frac{t^3}{3} - \frac{2at\sin \omega t}{\omega^2} - \frac{2a\cos \omega t}{\omega^3} + \frac{a^2}{2\omega^2}t + \frac{a^2}{4\omega^3}\sin 2\omega t\right) + \cdots\right] + K \qquad (8).$$

Transferring the exponential to the right-hand side, we have:

$$I = \frac{E}{L} e^{-\frac{R}{L}(t - \frac{a}{\omega}\cos \omega t)}\left[t + \frac{R}{L}\left(\frac{t^2}{2} - \frac{a}{\omega^2}\sin \omega t\right) + \frac{R}{2L^2}\left(\frac{t^3}{3} - \frac{2at\sin \omega t}{\omega^2} - \frac{2a\cos \omega t}{\omega^3} + \frac{a^2}{2\omega^2}t + \frac{a^2}{4\omega^3}\sin 2\omega t\right) + \ldots\right] + K \qquad (9).$$

The value of the constant of integration, K, is found by introducing into equation (9) the conditions that dI/dt=0 when t=0. In other words, there is no current in the secondary when the diaphragm is at rest, which is the physical condition of the apparatus. With these conditions, we have K=E/R=I_o, where I_o is the current in the primary circuit when the transmitter is undisturbed.

Equation (9) shows, then, that the form of the current in the primary when the diaphragm is responding to a simple wave-motion is a very complex undulatory current, equivalent to a complex alternating current, represented by the variable terms of the second member of (9), superposed on a steady current K=E/R.

Equation (9) is the complete solution for the current in the primary circuit. Only the first two terms in the series are given

here. The exponential series is very rapidly convergent and hence its integral is also convergent. Such a solution is therefore allowable. The e. m. f. induced in the secondary will be:

$$E' = M\frac{dI}{dt} \qquad (10).$$

where M is the coefficient of mutual induction of the two circuits.

Equations (9) and (10) are so complicated and difficult of interpretation, however, that it will be worth while to find a simpler, though less exact, solution. Neglecting, then, the inductance of the primary circuit, which will render the solution

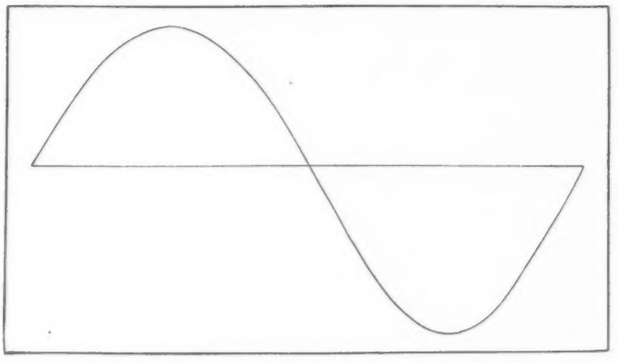

Fig. 2—The Unsymmetrical Primary Current.

only an approximation, but close enough an approximation and of such interest as to be worth while, we may write

$$I = \frac{E}{R\,(1 + a \sin \omega t)} \qquad (11).$$

Expanding the second member in the form of a series

$$I = \frac{E}{R}\,(1 - a \sin \omega t + a^2 \sin^2 \omega t - a^3 \sin^3 \omega t + \text{etc.}) \qquad (12).$$

Whence

$$\frac{dI}{dt} = -2\pi f a \frac{E}{R}\,(\cos 2\pi f t - a \sin 4\pi f t + 3a^2 \sin^2 2\pi f t \cos 2\pi f t - \text{etc.}) \qquad (13).$$

Equation (13) gives the form of the e. m. f. induced in the secondary by that in the primary, shown in (12). Only three terms are given, since the third is so small as to affect the result only in the third decimal place. The value of the current

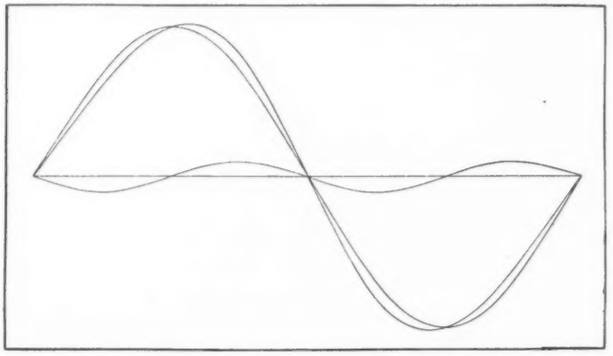

Fig. 3—Current in Secondary and First Two Partial Tones with a 10% Change of Resistance in Transmitter.

in the secondary will, of course, depend also upon the relation of resistance, inductance and capacity in this circuit.

As in the complete solution, we see that the current in the primary is an undulating current equivalent to a steady current $I=E/R$ with an alternating current superposed upon it. This current is shown in Fig. 2, where the line of reference is not $I=o$, but $I=E/R$.

The secondary current is a true alternating current. It is not of simple sine form, but possesses higher harmonics, notably the octave of the impressed tone. Fig. 3 is the graph of the part of the right-hand member of (13) in the parenthesis, showing the first two terms (the third being too small to represent on this scale) and the combination of the two. In this figure "a" was taken equal to 0.10, which would mean a variation of the resistance of the primary circuit equal to 10 per cent, or that caused by a rather loud tone. Fig. 4 shows the same thing for a=0.05. Comparing these two figures it is seen that the distortion is greater for a loud tone than for a lower one. Equation (13) shows that the total current in the secondary is proportional to "a," the amplitude of the impressed vibration, and that the distorting harmonic is proportional to the square of the amplitude, that is, the octave increases in intensity as the square of the amplitude, while the total intensity increases only as the first power.

Equation (13) also shows that the electrical energy in the secondary circuit will be approximately proportional to $f^2\,a^2$, that is, to the square of the amplitude and also to the square of the frequency. The same is exactly true of a sound wave in air; therefore, the energy (electrical) in the secondary circuit, is directly proportional to the energy (mechanical) of the sound wave falling upon the diaphragm.

If, then, we had a transmitter that would neither heat nor pack, such an arrangement, with a sensitive dynamometer in the place of the receiver could be used to compare the power of sound waves. The ordinary transmitters will not serve this

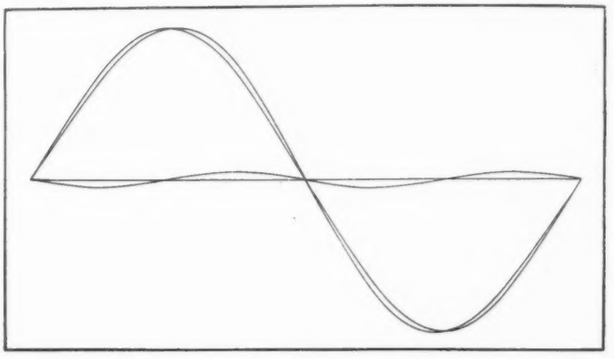

Fig. 4—Secondary Current and Partial Tones with 5% Change of Transmitter Resistance.

purpose, however. If a tone be sung before a transmitter, the dynamometer being in the secondary, the latter will give a comparatively large deflection which falls off very rapidly. This is true when a storage battery is used, showing that the effect is not due to polarization of the cells.

Since the energy of a wave is proportional to the square of the frequency, a given tone will have only one fourth the power of its octave if the amplitudes are equal. With the dynamometer in the circuit, it is much easier to produce a large deflection with a high tone than with a low one.

From the above analysis the following conclusions are to be drawn:

A simple sinusoidal sound wave falling upon a transmitter does not produce a simple sinusoidal electrical wave in the receiver circuit. The latter has harmonics,— the octave of the impressed tone being especially prominent.

The distortion increases as the square of the amplitude of the impressed wave. This will explain why a shrill soprano or a rumbling bass is so hard to understand unless the speaker talks very softly.

The energy (of the fundamental) in the receiver circuit is directly proportional to that of the impressed wave.

Modern Toll Switchboard Equipment*

By J. E. Hilbish, J. B. Thiess and G. A. Joy

In Fig. 48 is shown a voltmeter or ammeter circuit of a type with which every Morse or test board should be equipped. Its wiring is extremely simple, and permits considerable flexibility in manipulation. By plugging into jack No. 2 the meter will be bridged across the circuit attached to the plug, while by use of jacks Nos. 1 and 3

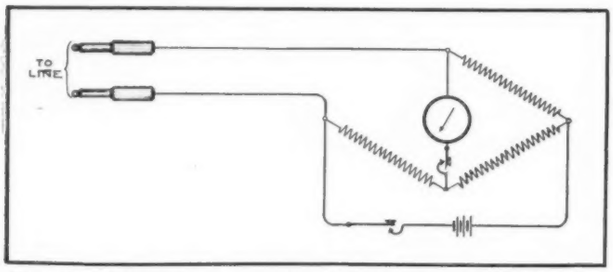

Fig. 48.—Voltmeter or Ammeter Circuit for the Test Board.

practically any combination is possible. For example if the tester desires to determine whether or not a line is grounded, he can, by means of the two single conductor cords and plugs, readily set up a circuit which will enable him immediately to obtain the desired information. Thus, if the regular battery jack were connected to jack No. 3, and jack No. 1 to the line under test, a deflection of the needle would occur if the line were grounded. If the object was to determine whether or not foreign current existed on the line, the tester could readily find out by inserting the plug attached to a cord connected to jack No. 3 into one of the regular ground jacks, or by inserting one of the ground plugs directly into jack No. 3. The circuit, as previously stated, is most necessary, and in the hands of an experienced operator can be used for making a great variety of useful tests.

Another test circuit which is used very extensively is the "Bridge Circuit," Fig. 49. The two plugs shown in the diagram are inserted into jacks to which are connected the two respective wires of the circuit that is to be measured, which thereby supplies the fourth or unknown arm of the bridge.

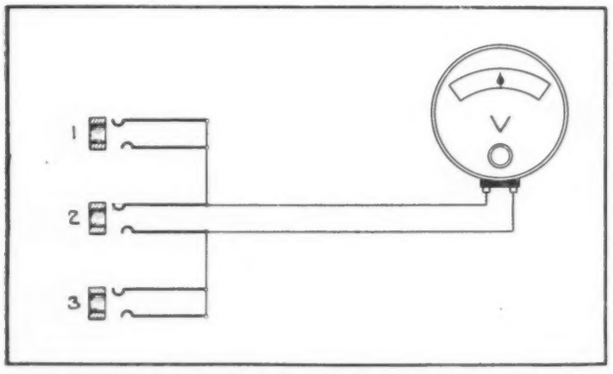

Fig. 49.—The "Bridge Circuit" for the Test Board.

There is one more test circuit which is essential to the successful operation of a test or "Morse" board, namely, the galvanometer circuit shown in Fig. 50. This circuit is so wired that galvanometer measurements can be made out on the line direct, and since some of the circuits, such as those for duplex telegraphy, which are operated from this board, require a very close balance, an instrument of high sensibility, such as a galvanometer, is very desirable. In case the instrument is wired as shown in the figure, the operation of setting up the circuit is extremely simple. All that is necessary is to insert the battery plugs into the jacks on which exist the desired difference of potential, and the line plugs into the jacks of the line under test. Under these conditions the galvanometer, battery, and line will be in series, as is desired. Furthermore, if the tester wishes to use the galvanometer in connection with other apparatus, the method of wiring shown enables him to do so.

In the preceding sections of this article there have been shown and described the methods of wiring of the principal circuits found in a board of this character. No less necessary for a complete understanding of the subject is a knowledge of how these circuits are installed and distributed in the board proper. Fig. 51 is a diagram of the face equipment of a regular "through" testboard. The board is called a "through" test-board in distinction from the so-called terminal station board. The terminal station is, as the name implies, at the terminus of a group of lines, i. e., it is not at an exchange between two other long-distance offices. Hence, in the terminal station we

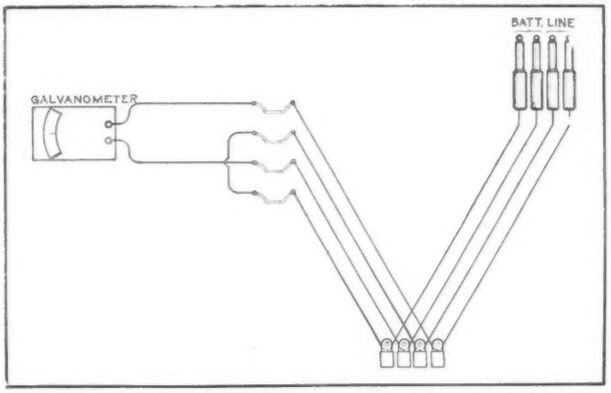

Fig. 50.—Galvanometer Test Circuit for the "Morse" Board.

find a large number of leased lines, and a much greater amount of local business, whereas, the work at the through station consists mostly of interconnecting two or more long-distance offices. However, it will be obvious from what has just been said that the equipment shown for the through station can be easily modified to a form suitable to fulfill the requirements of a terminal station, by the addition of panels for leased lines.

The apparatus used in the various circuits is all properly designated on the drawing to facilitate description. Attention may be given first to the four panels labeled "Toll Line," each consisting of three complete vertical rows of jacks. These jacks are the same as shown in Fig. 42 from which it will be noted that the jacks are arranged in pairs, the first two horizontal rows of jacks in each panel corresponding to one line, the next two rows to another line, etc. As will be observed, these panels are labeled North, South, East and West respectively, which indicates, as one would naturally infer, that the lines from the north terminate in the north panel, those from the south in the south panel, etc. On each side of eash of these line panels is a panel in which are installed composite and phantom plugs,

*Continued from issue of November 14, 1908.

the former of which are shown in Fig. 43. Above each one of the plugs is placed a designation card, so as to facilitate the locating of any circuit. The single conductor "Morse leg" plugs of these composite circuits are located in the panel marked "Morse Legs," and each of these plugs is, like the regular composite plugs, provided with a designation strip to facilitate the ready determination of associated apparatus. In the panel marked "Battery" are placed the battery jacks, the wiring of which is shown in Fig. 45. The panel marked "Repeater" contains the jacks in which the circuits of the telegraph repeaters terminate. It might also be well to state in passing that it is feasible and not uncuits is all properly designated on the drawing and therefore only a very brief reference to a few of them is made here. Thus, beneath the regular panel equipment in the face of the board is the ground jack, often needed in testing, and the volt and ammeter jacks, which are wired from the instruments shown above in accordance with the diagram shown in Fig. 48. The equipment drawing also shows the two galvanometer battery jacks and the office trunk jacks used for intercommunication between this board and the regular toll board, and for reaching the desks in the office. On the key and plug shelf is shown the equipment for the regular test circuit (Fig. 46); the operator's telephone

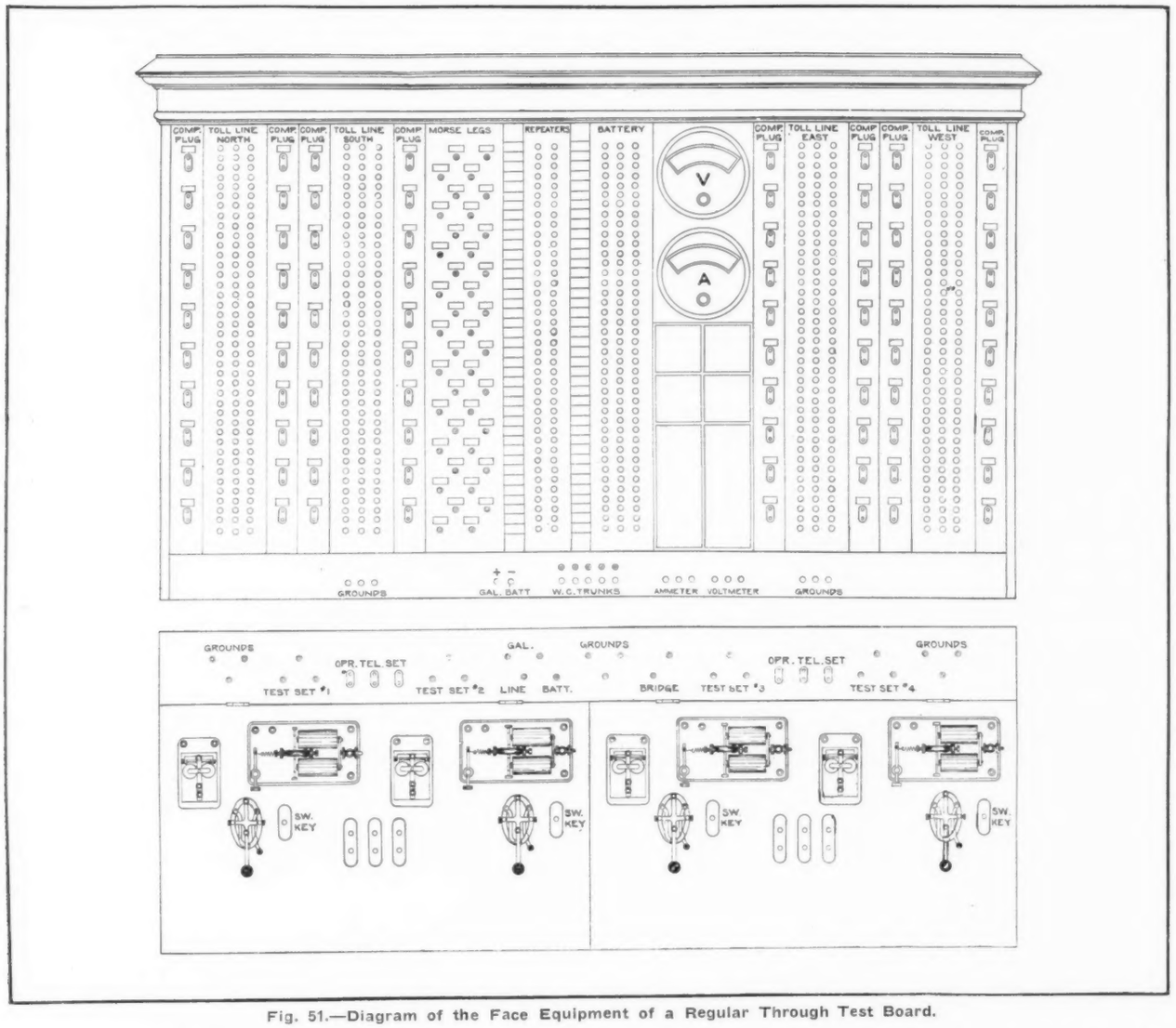

Fig. 51.—Diagram of the Face Equipment of a Regular Through Test Board.

common to multiple the composite plugs in several panels, so as to cut down the amount of equipment and still have the apparatus convenient for connection with any line.

The simplicity of operation which this arrangement affords is noteworthy. As an example to show this, suppose it is desired to composite a line. The attendant needs but insert the composite plugs on either side of the line panel into the proper line jacks, and the "Morse leg" plugs into the desired "leased line," or repeater jack, and the operation is completed. Other circuits which are customarily set up at this board can be put up with like speed and certainty.

As the apparatus for the testing and miscellaneous circuit (Fig. 47); the bridge circuit (Fig. 49); and the galvanometer circuit (Fig. 50).

While, in the equipment shown, the plugs used in connection with the simplex and composite circuits are all in the face of the board, it is even more common, although not so convenient, to have all these plugs on the shelf. The objections to this latter arrangement are, first, the resulting tangle of cords across the face of the board when a number of connections are up, and, second, the space on the shelf utilized by this equipment should be reserved for the testing apparatus. However, notwithstanding these objections, for small equipments this type of board gives excellent satisfaction.

Specifications for Rubber Covered Wire

The following is an abstract from the proceedings of the twelfth annual meeting of the Railway Signal Association, held at Washington, D. C., Oct. 13, 14 and 15, 1908:

The Railway Signal Association:

Your special Committee on Rubber Covered Wire and Cable has the honor to submit the following report:

On January 18, 1908, the following sub-committee were appointed by the Chairman:

Mr. Heywood of the Philadelphia Rapid Transit Company, a sub-committee to co-operate with the American Institute of Electrical Engineers.

Professor V. I. Smart, McGill University, Chairman, and Mr. W. J. Eck of the Southern railroad a sub-committee to investigate the effect of impurities in copper on the properties of conductors.

Mr. J. W. Young of the Erie Railroad, Chairman, and Mr. W. L. Dreyden of the Staten Island Rapid Transit Company, a sub-committee on copper-clad steel wire.

On January 20, 1908, Mr. E. L. Adams, Chief Signal Inspector of the Lake Shore, was added to the membership of the committee.

On May 11, 1908, a meeting of the whole committee was held in New York, with the following members present:

Messrs. Adams, Ames, Dreyden, Watson and Young.

On May 12, 1908, the progress report on the work of the committee was presented at a stated meeting of the Railway Signal Association in New York.

On June 19, 1908, a conference was held at the Engineers' Club in New York with a Committee of the Rubber Covered Wire Engineers' Association, consisting of Messrs. Conner, Reed, Wallace Clark, Haskell and Brixey, together with Messrs. Adams, Ames, Dreyden, Heywood, J. D. Phillips, Watson and Young of this committee.

On July 24, 1908, a meeting of the full committee was held in New York, at which were present Messrs. Adams, Ames, Dreyden, Heywood, Richards, Whitcomb, Watson and Young.

The last report of this committee presented at the annual meeting at Milwaukee reaffirmed the specifications for rubber covered wire adopted at the previous annual meeting at Washington, with certain minor changes and a new table of insulation resistance. So much discussion resulted at the Milwaukee meeting on some of the details of the specification for single conductors that the cable specifications were not discussed, nor the recommendations of the committee in regard to the revised table of insulation resistance adopted. The only formal action taken was the referring of the whole question of specifications back to the committee.

The committee's report is found on pages 65 to 71, inclusive, of Advance Notice No. 5, Volume 10, and a portion of the report, together with the discussion thereon, is found on pages 398 to 413 of Volume 10 of the Journal, dated December, 1907.

In accordance with its special instructions, the committee gave a hearing to Mr. Brixey on June 19 at the conference with the Committee of the Rubber Covered Wire Engineers' Association, and it gave a hearing to Mr. Langan at its meeting of July 24.

It has not consulted with rubber manufacturers who do not make insulation for wire, because it did not feel that anything was to be gained by so doing.

The sub-committee appointed to consult with the Institute of Electrical Engineers reports that up to the time of filing of this report the Institute of Electrical Engineers have taken no final official action toward the adoption of specifications for rubber covered wires and cables.

The following data from the report of the sub-committee on the effect of impurities in copper will be found to be of interest to telephone men.

THE EFFECT OF IMPURITIES IN COPPER FOR USE AS ELECTRICAL CONDUCTORS.

The presence of any foreign element in copper manifests itself by its effects on the conductivity, malleability, ductility, and tensile strength of the wire.

The conductivity is invariably reduced whenever the slightest trace of anything but pure copper is in the wire, and a certain test for the presence of any impurity is an increase in its electrical resistance over that of pure copper, due to the presence of the foreign body.

These impurities may consist of other metals, or, which is more common, a form of copper oxide which is apparently produced and dissolved in the copper under certain conditions when in a molten state, as it is not produced by heating to a temperature below the melting point of copper.

Modern processes of manufacture can, however, eliminate practically all impurities, and, in fact, the ordinary commercial grades of copper wire made of electrolytic wire bars is so nearly pure copper that the wire generally has a conductivity nearly equal to the supposedly pure copper used by Dr. Matthiessen in his determination of the standard for electrical resistance of copper.

In view of the above facts, it is respectfully suggested that the requirements of the specifications in reference to electrical conductivity be unchanged.

Attached is a table showing the effect of one-tenth of 1 per cent of various impurities in copper wire.

This table was deduced from a table showing the results of a test by J. O. Mouchel of Paris. He succeeded in producing a sample of pure copper wire which had a conductivity of 104.69 per cent of Dr. Matthiessen's standard. Assuming this sample to have been pure copper, and using it as a standard, or 100 per cent conductivity, we have the following results:

EFFECT OF ONE-TENTH PER CENT ADMIXTURE OF VARIOUS SUBSTANCES WITH COPPER.

Alloying Material	Conductivity Compared to Soft Copper 100	Elongation Per Cent.	Tensile Strength in lbs. per sq. Inch.
Lead	99.38	36.20	27,165
Molybdenum	98.65	33.50	31,163
Cobalt	98.18	38.15	29,342
Silver	98.01	4.25	41.295
Sulphur	98.00	37.55	30,608
Gold	97.94	32.45	29,342
Selenium	97.86	30.42	38,758
Thallium	97.83	36.10	30,253
Zinc	97.76	35.32	38,506
Antimony	95.59	30.00	32,801
Tellurium	95.37	1.82	58,841
Platinum	94.80	38.80	28,986
Nickel	93.96	39.00	29,712
Tungsten	92.43	36.35	30,609
Tin	91.99	3.65	46,133
Chromium	90.75	33.55	32,615
Magnesium	90.06	3.75	51,996
Aluminum	86.49	35.20	31,519
Iron	79.68	32.65	31,377
Arsenic	73.89	39.10	30,879
Silicon	64.52	20.65	26,083
Phosphorus	51.86	31.25	33,327

It will be noted that the conductivity is decreased in every case, while the tensile strength is increased, the tensile strength of pure annealed copper being about 30,000 lbs. per square inch.

The following properties of copper containing impurities, while interesting, are of little practical value on account of commercial copper being generally free from the various substances named. This table has been compiled by Mr. Joseph W. Marsh of the Standard Underground Cable Company.

Iron. Does not affect the mechanical properties; .03 of 1 per. cent reduces conductivity by about 4 per cent.

Lead. ⅛ of 1 per cent makes copper red-short (i. e. brittle when red hot) and cold-short, and ¾ of 1 per cent ruins the copper entirely for ordinary purposes. Its effect upon the conductivity is small, .35 of 1 per cent reducing it by about 1 per cent.

Tin. Injures ductility when 1 per cent is present. When .05 of 1 per cent is present it reduces the conductivity by about 4 per cent.

Bismuth. .02 of 1 per cent makes copper red-short, and .05 of 1 per cent makes it cold-short. Its effect upon conductivity is small, .05 of 1 per cent reducing it by about ¼ of 1 per cent.

Arsenic. Slightly affects ductility, but when as much as .8 of 1 per cent is present, the metal can still be drawn into fine wires. It has a very marked effect upon conductivity and .01 of 1 per cent reduces the conductivity by about 4 per cent, and .14 of 1 per cent reduces the conductivity by about 35 per cent.

Antimony. .05 of 1 per cent acts like the same percentage of arsenic so far as mechanical properties are concerned; in larger quantities it is more injurious than arsenic. When .035 of 1 per cent it reduces the conductivity by about 4 per cent.

Silicon. .3 per cent must be present before toughness and malleability are affected. 6 per cent makes the copper brittle. .15 of 1 per cent reduces the conductivity by about ½ of 1 per cent.

Sulphur. ¼ of 1 per cent lowers the malleability and ½ of 1 per cent makes it cold—short, but not red-short. .14 of 1 per cent reducing it by about 20 per cent.

Phosphorus. .4 of 1 per cent makes it red-short. The effect of this impurity upon the conductivity is enormous, .01 of 1 per cent reducing it by about 20 per cent.

PROPERTIES OF COPPER.

Specific gravity	8.98	
Weight per cu. in.	.321	lbs.
Weight per cu. ft.	555.0	lbs.
Weight per mil. ft.	.00000303	lbs.
Resistance per cu. in. 60° F.—15.5° C.	.0000006774	ohms.
Resistance per cu. mil. ft. 0.° C.	.000001594	ohms.
Resistance per cu. mil. ft. 0.°C.		
Soft drawn, 0.° C.	9.529	
Hard drawn, 0.° C.	9.741	
Tensile strength per sq. in.		
Soft drawn	+30,000.0	
Hard drawn	50,000. to 60,000.	lbs.
Coefficient of expansion C.(0.°—100° C.)	.0000167	lbs.
Coefficient of expansion F.(0.°—100° C.)	.0000093	lbs.
Melting point (mean)	1100° C.	
Boiling point	2100° C.	

$$\text{Weight per mile} = \frac{(\text{diam. in mills})^2}{62.5} \text{ lbs.}$$

$$\text{Resistance per mile } 60^\circ \text{ F.} = \frac{54.692}{(\text{diam. in mills})^2} \text{ ohms.}$$

Resistance at t° C. $= r\,(1 + .00388t)$, when r = resistance at 0.° C., t = observed temperature.

$$\text{Percentage of Conductivity} = \frac{100r}{r_1},$$ when r = resistance of same size wire of same length and temperature as sample whose conductivity is desired; taken from standard tables.

r_1 = resistance of sample wire.

In hardness copper is between iron and platinum.

In ductility copper is between iron and aluminum.

In malleability copper is between silver and tin.

In conductivity copper is between silver and gold.

The superlative degrees being first in each case; i. e., copper is softer than iron and harder than platinum.

Copper is easily dissolved in hot concentrated—sulphuric acid, nitric acid, aqua regia.

Copper is slowly dissolved by—muriatic acid, dilute sulphuric acid.

Copper is readily attacked by compounds containing sulphur and must be protected from its action when used near such substance. A coating of tin is the most common protective measure used.

The Sub-Committee appointed to prepare specifications for copper clad steel wire has made a considerable investigation of this subject and on the basis of their report the committee voted as follows:

It was found that the only copper clad steel wire now on the market or considered by the committee, is the Monnot wire, made by the Duplex Metals Company.

It was the sense of the committee that in view of the short time that this wire has been in use, no specifications for it should be embodied in the report, nor any figures as to its properties, though it is the committee's opinion that as the tensile strength of this wire is greater than that of hard drawn copper, it may be used on signal circuits where conductivity is an inconsiderable factor, and it is believed desirable that the various members of this association experiment with this wire to determine its properties in actual service. The use of this wire is also suggested for bonding on track circuits.

Various articles on the subject before the committee have been studied by its members, visits made to factories and various conferences held with manufacturers and others and as a result of its work for the year the committee desires to reaffirm, with the exception of a few minor details, the specifications for rubber covered wire and cable as adopted at Washington, with the exception of the insulation resistance table proposed by it at the Milwaukee meeting.

We print below certain abstracts of the specifications proposed by the committee.

Attention is called to the following changes from previous reports:

Paragraph 5, Physical Tests of Copper Conductors—A change in the torsion requirements to suit the various sizes of conductors.

Paragraph 8, Tests of Braiding—Correction made to include the weight of tape in making the absorption test.

Paragraph 9, Physical Tests of Rubber Insulation—A 7-16-inch set instead of a ⅜-inch set is permitted on account of many excellent compounds not being able to quite meet the requirement of a ⅜-inch set.

Paragraph 10, Chemical Tests of Rubber Insulation—An ash test has been added, with a minimum of 62 per cent and a maximum of 68 per cent, the committee believing that this will aid materially in determining whether or not the proper amount of rubber has been put into the compound.

Paragraph 11, Electric Tests of Rubber Insulation—It has been found that 100 volts is sufficient potential for the testing battery for insulation resistance and that most manufacturing plants are not equipped with batteries capable of showing 150 volts as per the former specifications.

SPECIFICATIONS FOR RUBBER INSULATED SIGNAL WIRE.

(600 Volts or Less.)

1. Conductors—

Conductors must be of soft-drawn, annealed copper wire having a conductivity of not less than ninety-eight (98 per cent) per cent of that pure copper. Each wire forming a conductor must be continuous without splice throughout its length, must be uniform in cross section, free from flaws, scales and other imperfections and provided with a heavy uniform coating of tin.

2. Rubber Insulation—

The vulcanized rubber compound shall contain not less than 30 per cent, nor more than 33 per cent by weight of fine dry Para rubber which has not previously been used in rubber compound. The gum itself shall not contain more than three and one-half per cent of resinous extract. The remaining 70 per cent of the compound shall consist of mineral matter only. The insulation must be tough, elastic, adhering strongly to the

wire, must be homogeneous in character and placed concentrically about the conductor.

3. Taping and Braiding—

(a) The rubber insulation must be protected with a layer of cotton tape thoroughly filled with a rubber insulating compound, lapped one-half its width and so worked on as to insure a smooth surface.

(b) The outer braid must consist of one layer of closely woven cotton braiding at least 1-32-inch thick, saturated with a black, insulating, weatherproof compound which shall be neither injuriously affected by nor have injurious effect upon the braid at a temperature of 200 degrees Fahrenheit.

4. Tests—

The manufacturer must provide at his factory all apparatus and other facilities needed for making the required physical and electrical tests and must provide the purchaser's representative with all facilities for assuring himself that the 30 per cent of rubber as above specified is actually put into the compound. The inspector shall not be privileged to ascertain what mineral ingredients are used in making up the remaining 70 per cent of the compound. The manufacturer shall give free access to the place of manufacture and opportunity to test at all necessary times. Tests may also be made upon the finished product after delivery, and the wire will be rejected if it fails to meet the requirements of the specifications. The manufacturer must pay freight charges for return of all wire that may be rejected by the purchaser.

5. Physical Test of Copper Conductors—

Each solid conductor must stand an elongation of 25 per cent of its length in ten inches before breaking. It must be capable of being wrapped six times about its diameter and unwound without showing signs of breakage after this process has been gone through twice. The tension and torsion tests will be made on separate pieces of wire.

TORSION TEST.

No. 2 to No. 6—20 twists in six inches.

No. 8 to No. 10—45 twists in six inches.

No. 12 and smaller—80 twists in six inches.

6. Conductivity Test of Copper—

The conductivity of the copper shall be determined by measuring the resistance of a length of the wire and comparing with Matthiessen's standard of copper resistance.

7. Tests of Tinning—

Samples of the wire shall be thoroughly cleaned with alcohol and immersed in hydrochloric acid of sp. g. 1.088 for one minute. They shall then be rinsed in clear water and immersed in a sodium sulphide of sp. g. 1.142 for 32 seconds and again washed. This operation must be gone through with four times before the wire becomes clearly blackened.

8. Tests of Braiding—

Six inch sample of wire with carefully paraffined ends shall be submerged in fresh water of a temperature of 70 degrees Fahrenheit for a period of 24 hours. The difference in weight of the sample before and after submersion must not be more than 10 per cent of the weight of the sample before submersion less the weight of the copper, vulcanized rubber and tape.

9. Physical Tests of Rubber Insulation—

A sample of the vulcanized rubber insulation not less than four inches in length shall have marks placed upon it two inches apart. The sample shall be stretched until the marks are six inches apart and then at once released. One minute after such release the marks shall not be over 2 7-16 inches apart. The sample shall then be stretched until the marks are nine inches apart before breaking and must have a tensile strength of not less than 800 lbs. per square inch.

10. Chemical Tests of Rubber Insulation—

The vulcanized rubber compound shall contain not more than six per cent by weight of acetone extract and not more than 7-10 of one per cent of free sulphur; a minimum of 62 per cent and a maximum of 68 per cent of ash.

11. Electrical Tests of Rubber Insulation—

The circular mills cross section, the thickness of the rubber insulation (measured at the thinnest point), the minimum insulation resistance in megohms per mile and the dielectric strength for the various sizes of wire shall conform to the following table:

Size B. & S. Gauge.	Area in Circular Mills.	Thickness of Insulation.	Test Voltage Alternating Current.
0	105,502	1/8-in. wall	10,000
1	83,694	1/8-in. wall	10,000
2	66,373	1/8-in. wall	10,000
4	41,742	3-32-in. wall	9,000
6	26,250	3-32-in. wall	9,000
8	16,509	3-32-in. wall	9,000
9	13,090	5-64-in. wall	7,000
10	10,380	5-64-in. wall	7,000
12	6,530	5-64-in. wall	7,000
14	4,107	5-64-in. wall	7,000
16	2,583	1-16-in. wall	4,000
18	1,624	1-16-in. wall	4,000

INSULATION RESISTANCE, MEGOHMS PER MILE, 60DEGREES FAHRENHEIT, ONE MINUTE ELECTRIFICATION.

	3-64	2-32	5-64	3-32	7-64	4-32	5-32	6-32	7-32	8-32
1- 0 stranded	....	....	....	600	700	800	900	1100	1200	1300	1500
1 solid	.....	....	....	700	900	1000	1100	1300	1400	1600	1700
2 solid	.....	....	700	800	1000	1100	1200	1400	1600	1700	1900
3 solid	.....	....	800	900	1000	1200	1300	1500	1700	1900	2000
4 solid	.....	....	800	1000	1100	1300	1400	1600	1800	2000	2100
5 solid	.....	....	900	1000	1200	1400	1500	1700	1900	2100	2300
6 solid	.....	....	1000	1200	1300	1500	1600	1900	2100	2300	2400
8 solid	.....	1000	1200	1400	1600	1700	1900	2100	2400	2600	2800
9 solid	.....	1000	1300	1500	1700	1900	2000	2300	2500	2700	2900
10 solid	.....	1100	1400	1600	1800	2000	2200	2400	2700	2900	3100
12 solid	.....	1300	1600	1900	2100	2300	2400	2700	3000	3200	3400
14 solid	.....	1600	1900	2100	2400	2600	2700	3100	3300	3600	3800

The test for insulation resistance must be made upon all wire after at least 12 hours submersion in water and while still immersed results being corrected to a water temperature of 60 degrees Fahrenheit. Tests must be made before the application of tape, braid or other covering with a well insulated battery and galvanometer, with not less than 100 volts and readings must be taken after one minute's electrification. The test voltage must be applied to the completed length of wire before the insulation test for a period of five minutes, using alternating current from a generator and transformer of ample capacity.

At the conference between this committee and that of the Rubber Covered Wire Engineers' Association on June 19th, a memorandum was presented by the latter committee, which is given below (in part):

Memorandum of June 19th.—At a meeting of the Rubber Covered Wire Engineers' Association specifications for railway signal wire were carefully considered and all the points mentioned in letter of Chairman Ames of the Railway Signal Association Committee to President Morse, dated May 16, were fully discussed, and it was unanimously agreed to report to the Signal Engineers' Committee our views on the points raised practically as follows:

1st. Voltage tests should not be so high or so prolonged as to impair the voltage resisting qualities of the insulating compound.

It is possible for an excessive voltage to overstrain the rubber insulation, so altering its physical structure as to weaken it electrically without actually breaking it down, but the tests specified in our 1907 specification are well within the limit of safety.

Under certain conditions a prolonged high voltage may be indirectly detrimental to the rubber compound either by excessive heating from various causes, or by oxidation from the ozone produced by the static discharges, but such causes have no practical significance for the reasonable voltages and duration of tests now proposed.

2d. The mean or maximum value of the test voltage should of course approximate as nearly as possible to the theoretical value for a sine wave. That is, the maximum value should be about 1.4 times that of the mean effective value; otherwise the readings on the commercial instrument would not be a

fair indication of the strain to which the insulation had actually been subjected.

With the suitable testing equipment there should be no danger of excessive voltage on this account, especially when it is remembered that the proposed voltage requirements are based on actual experience with apparatus in commercial every day use.

It may well be assumed that a manufacturer would for his own protection provide a testing outfit of proper design and of sufficiently ample rating as to prevent any undue distortion. Although a spark gap may be employed to indicate the maximum voltage, its use in practice is limited, as it has to be set for some definite voltage or else the two poles made to approach each other gradually, in which latter case it is not always possible to measure the voltage at the instant desired. The spark gap method is also subject to inaccuracies, as the sparking distance for a given voltage would depend upon the size and shape of the points employed, as well as on the atmospheric and other conditions. The spark gap may even be a source of danger due to the possible rises in voltage when it sparks over.

3d. We believe that the voltage test requirements as specified by Rubber Covered Wire Engineers' specifications of 1907 are about right, and that if they are applied to signal wire, railroads will receive less defective wire than they would if lower voltages were applied.

We believe that the insulation resistance requirements as advocated by the Signal Engineers' Convention at Milwaukee meeting, 1907, are fully as high as they should be.

4th. If an ash test is adopted the requirements should be a minimum of 60 per cent and a maximum of 70 per cent.

A compound known as Kerite is so entirely different in its nature from all other compounds used for insulating, we have found it impossible to suggest a specification unless all reference to acetone extract, mineral matter, and ash test be left out, that will include it, and at the same time be a satisfactory specification for other compounds, and inasmuch as wires insulated with Kerite have been in use for fifty years, and have proved their merit, we suggest that a special specification be made for them, in which the mechanical and electrical requirements be the same as called for by general specifications.

As a result of the committee's instructions to give a hearing to Mr. Brixey and his taking up the question of Kerite compound with the Rubber Covered Wire Engineers' Association, the latter included in their memorandum of June 19, the paragraph next above written, in which the committee concurs with the exception that it does not desire to present separate specification for his compound.

The Most Important Points to Keep in the Minds of the Public.*

By J. B. Gaffney.

In offering suggestions as to the most important points to be kept in the minds of the public, the first most important thing is for every employe to feel responsible for keeping before the public that we are "always at their service"; that we can furnish them with the best possible service at a reasonable rate and that so long as they assist us by paying all bills promptly when due, thereby aiding us by cutting to a minimum the cost of handling their business, and so long as we can furnish them service without paying out for collecting an amount almost equal to the amount of the account itself, so long can we furnish them with service at a reasonable rate.

Especially at this stage of the telephone business, we should keep the public informed of our long-distance connections. Get them to give us a chance at a share of their business and by our courtesy and promptness in handling what business we can secure from the public, get them to patronize us entirely. Keep in their minds that owing to the nature of the telephone business we feel compelled to give uniform and courteous treatment to telephone users, and that in return we feel we have a right to expect from the public uniform and courteous treatment, but that we are too busy to resent discourtesy, our only recourse being to disconnect our service whenever and wherever the discourtesies become unbearable; and that if our service pleases them, they should tell their friends, and if not they should tell us.

Every person desiring the success of the telephone business should feel called upon to show that desire by speaking well of the business, and either speaking well of the company with which he or she is connected, or changing to some other business or some other company. No self-respecting person should remain in the service of a company that he or she thinks is a failure, or is failing; and, therefore, everyone should stand up for the honor and credit and the success of the institution with which he or she is connected.

* Abstract of a paper read before the Northeastern Iowa Independent Telephone Association, October 15, at Waterloo, Iowa.

LETTERS ON PRACTICAL SUBJECTS

Cable Trouble in a Wisconsin Plant.

Our cable troubles are of three different classes: those caused by wires, by lightning and by change of temperature.

The trouble due to trees is caused by contact with the limbs of the trees; for example, the cable may become caught in a crotch and then, when the wind blows the motion of the tree bends the cable up and down, again and again, until the whole structure of the lead sheath is changed to a crystalline mass, and of course, these places open up and let in moisture when it rains. After the lead is taken off you can hold it up to the light and see through it in dozens of places.

This trouble only happened to the small cables, where the trees had grown up to them in the last year. Trees merely rubbing against a larger cable have never caused us any trouble. It's the constant bending that counts.

The second cause of trouble, lightning, seems to hit us wherever there is an abrupt turn in the cable, or wherever the cable touches another cable or messenger.

Cases in the third class, the temperature troubles, seemed to come wherever there was a sharp bend in the cable which had been later on straightened out.

Owing to the way in which our cable distributes, we were able by studying the causes of trouble to locate the various cables that were in trouble and, in most cases, to tell in what place, that is, between which junction boxes, the trouble was. This would leave three or four spans of cable to be looked over for the trouble.

On the long leads we make use of the regular cable tests, applied in a somewhat modified form.

N. Heineman,
Wausau, Wis. President Wausau Telephone Co.

Illinois Central Pleased With Telephone Train Dispatching.

It is reported from the offices of the Freeport Division of the Illinois Central Railroad that recent tests of telephone train dispatching have been successful. Eight offices of the Division were recently equipped as a result of the satisfactory operation of the system, and it is believed that, within a few months, a complete telephone system will be installed.

The test has continued over a period of three months, during which there have been no accidents of importance, and not even a minor accident has been traced to any defect in the service which may be laid to the telephone.

Reconstruction and Extension of a Farm Line Methods and Cost

By Clarence Mayer

As the most important construction work done by small telephone companies is the building of farmers' lines, it needs little argument to prove the value of keeping records of their cost by such a method that the costs may be analyzed and compared, and used for estimating the cost of future work. Especially is this true of farmers' lines more than any other class of telephone construction, because, in many instances, it is a very close question whether the building of a proposed line is justified by the immediate or prospective income. In such cases a knowledge of costs is imperative—the margin is too close for guess-work.

To illustrate methods of keeping costs of farm line construction, the job shown by the accompanying plan has been chosen, as it comprises practically every kind of construction and reconstruction for a rural line running between a town of about 3000 population and a very small village.

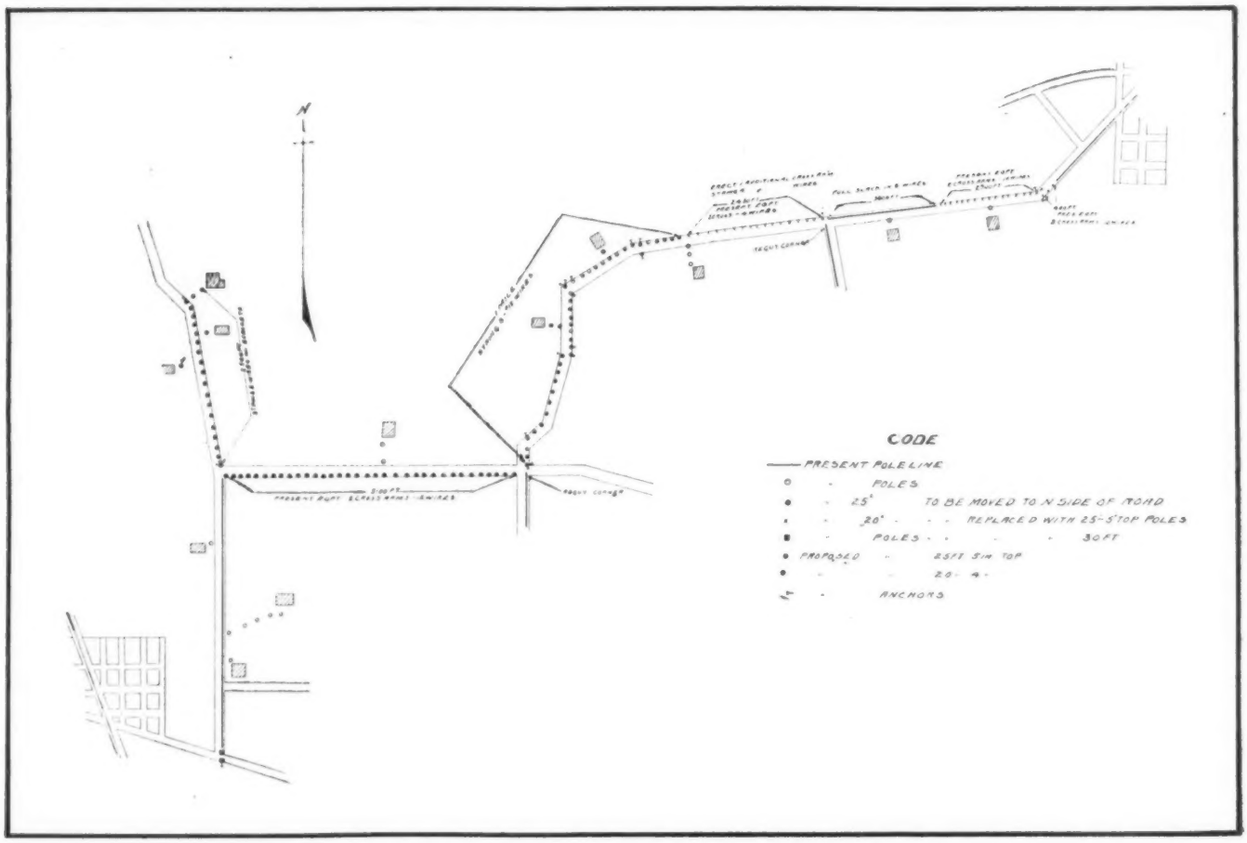

Fig. 1—Construction Map of a Farmers' Telephone Line.

While the labor costs of the work, tables 2 and 3, were not particularly low, still they are fair average costs.

Poles.

All poles were set about 150 ft. apart, except at right angle corners, road crossings and on curves and corners. At right angle corners, the sections nearest to the corner pole were 75 ft. in length. Road crossings were made at an angle of 45 degrees, and on curves and corners the spacing of poles was reduced 10 ft. for every 5 ft. of offset or pull in the curve. A 6-in. top pole was used at right angle corners. Poles were set to a depth of 4 ft. for 20-ft. poles and 4½ ft. for 25-ft. poles. All 25-ft. poles were roofed and had gains cut for two cross arms. All 20-ft. poles were roofed and equipped with two brackets. The cross arms used were 6-pin, attached and braced as shown by Fig. 2.

The wire used for circuits was No. 12 galvanized steel wire and transpositions were made every mile. One wire of each subscriber's drop was No. 12 galvanized steel, bare, and one was No. 12 insulated steel wire. The drops were attached at the house to two-point galvanized iron brackets.

All anchoring was done with Stombaugh anchors, with No. 4 steel guy wire. The end of the guy attached to the pole was wrapped twice around the pole and secured by a strand clip. Lag screws were used to hold the wrapping in place.

Material and Labor Costs.

The material quantities and labor costs given in the tables are taken from records kept on the work by a cost man. The prices of materials are based on current quotations on standard materials. These tables give both total

and average labor costs and quantities and cost of material.

The wages paid for an 8-hour day on the work were as follows:

Foreman, per month $65.00 and board at $1.00 per day.

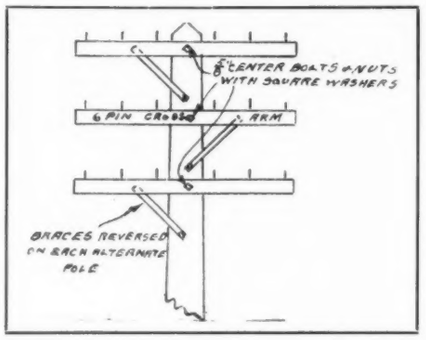

Fig. 2—Arrangement for Bracing Cross Arms on Poles.

Timekeeper, per 8 hour day $1.00, and board at $1.00 per day.

Combination men, per 8 hour day, $1.25, and board at $1.00 per day.

Linemen, per 8 hour day, $1.80 and board at $1.00 per day.

Ground men, per 8 hour day, $1.00 and board at $1.00 per day.

Team (2 horses without driver), per 8 hour day, $2.50 and board at 75c to $1.25 per day.

Only about two hours each day was spent by the timekeeper in keeping accounts. The balance of the day he worked as ground man.

The total cost of the work was as follows:

Cost of material	$262.38
Labor cost of new work	168.97
Labor cost of reconstruction work	243.55
Total cost	$674.90

Table 1 gives the quantities and cost of material. The prices of poles are based on poles, freight paid and unloaded from cars. Table 2, and 3 give, respectively, the total and average labor cost of extension and reconstruction. In these tables the item "supervision and expense" includes the cost of time spent by the foreman or timekeeper in supervising the work and keeping accounts, and carfare. Time spent by the foreman or timekeeper in doing manual labor is charged to the part of construction on which the time was spent. In figuring these costs the rate of wages is figured as if $2.80 was paid per 8-hour day to linemen instead of $1.80 and board, as customary.

3 30-ft. 6-in. top poles, at $3.45	$ 10.35
5 25-ft. 6-in. top poles, at $1.90	9.50
74 25-ft. 5-in. top poles, at $1.20	76.80
22 20-ft. 4-in. top poles, at $0.70	15.40
96 6-pin cross-arms (complete), at $0.41	39.36
52 oak brackets, per M $9.95	.52
420 pony glass, per M $11.04	4.64
38 transposition glass, per M $46.15	1.75
16 5-in. Stombaugh anchors, at $0.50	8.00
10 6-in. Stombaugh anchors, at $0.97	9.70
1000 ft. No. 4 steel guy wire, per M. ft., $4.60	4.60
52 5/16-in. Crosby clips, at $0.05	8.00
54½ by 4-in. lag screws, per hundred, 31.32	.71
10 5/6 miles No. 12 galvanized steel wire, at $4.65	50.38
2/3 mile No. 12 insulated steel wire, at $18.18	12:12
200 ft. No. 18 twisted pair rubber covered copper wire, per M. ft., $9.69	1.94
91½ lbs. No. 12 tie wire, per hundred lbs., $3.96	3.62
425 No. 12 iron connecting sleeves, per M., $13.50	5.74
10 2-point galvanized iron house brackets, $0.07½	.75
Miscellaneous material	3.90
Total cost of material	$262.38

Table 1—Quantities and Cost of Material.

In the cost of setting 20-ft. poles given in Table 2 "framing" includes the costs of attaching brackets.

Size of pole.	No of poles.	Teaming and labor in hauling.	Teaming.	Digging and locating.
30 ft. 6 in. top	1	$0.60	$0.13	$0.58
25 ft. 6 in. top	2	.82	.28	.98
25 ft. 5 in. top	39	13.65	5.46	17.16
20 ft. 4 in. top	22	6.38	1.54	7.92

Setting.	Supervision and expense.	Total cost.	Average cost per pole.
$0.30	$0.28	$1.89	$1.89
.48	.46	3.02	1.51
8.19	9.36	53.82	1.38
2.86	3.08	21.78	.99

Erecting 6—Pin Cross Arms.

No. of cross arms.	Teaming and labor in hauling.	Erecting.	Supervision and expense.	Total cost.	Average cost per pole.
96	$2.88	$7.68	$1.92	$12.48	$0.13

Setting Anchors and Anchor Guys.

No. of anchors, 26; teaming and labor in hauling, $2.62; setting anchor, $5.72; placing guy, $6.24; supervision and expense, $3.38; total cost, $17.96; average cost per anchor, including guy, $0.69.

Stringing No. 12 Wire.

No. of miles, 10 5-6; teaming and labor in hauling, $8.88; stringing and euipping, $35.64; supervision and expense, $9.32; total cost, $53.83; average cost per mile, $4.97.

Stringing Subscribers' Drops.

No. of drops, 6; teaming and labor in hauling, $0.54; stringing and equipping, $3.12; supervision and expense, $0.52; total cost, $4.18; average cost per drop, $0.70.

Table 2—Total and Average Labor Cost of New Work; Setting Poles in Clay Soil.

The advantage of cost records such as are given in these tables may be readily seen when one considers that on account of the character of soil being stated and the cost of digging being separated, the data may be used for estimating work where soil differs. Then again, costs being given separately for each division of pole setting, anchoring, stringing wire, and so on, the costs may be analyzed, compared, and used in figuring on new methods or new materials which affect only one division of work.

Size of new poles.	Size of old poles.	No. of poles.	Teaming and labor in hauling.	Framing.
30 ft. 6 in. top	25 ft.	2	$1.38	$0.24
25 ft. 5 in. top	20 ft.	17	7.48	1.70
25 ft. 5 in. top	25 ft.	21	10.71	2.52

Removing poles.	Digging and locating new poles.	Setting new poles.	Supervision and expense.	Total cost.	Average cost per pole.
$0.36	$1.22	$0.64	$0.70	$4.54	$2.27
2.38	7.99	3.91	3.74	27.20	1.60
3.99	11.13	5.46	5.88	39.69	1.89
Total				$71.43	

Moving Poles in Clay Soil.

Size of poles, 25; No. of poles, 34; teaming and labor in hauling, $7.48; digging and locating, $32.64; moving and resetting, $15.30; supervision and expense, $10.88; total cost, $66.30; average and cost per pole, $1.95.

Pulling Slack.

No. of miles, 72; teaming and labor in hauling, $0.20; pulling slack, $0.93; supervision and expense, $0.15; total cost, $1.27; average cost per mile, $1.78.

Removing and Replacing Wire.

No. of miles, 17; teaming and labor in hauling, $17.17; removing, $14.28; replacing and equipping, $56.27; supervision and expense, $16.83; total cost, $104.55; average cost per mile, $6.15.

Table 3—Total and Average Labor Cost of Reconstruction Work Replacing Poles.

A Complicated Trouble Report.

The Michigan State Gazette tells of a trouble man who was sent to clear a case of trouble which was located in the outside wires for which ordinary simplex wire had been used instead of regular drop wire. He made his repairs and report as follows: "Nature of Trouble: Inside wire is outside. Put outside wire on the inside from the top of building to the basement. How prepared: I run in outside wire outside of instead of inside wire outside."

The Telephone in the Courts

Conducted by A. H. McMillan

Changing Rural Company from Assessment to Rental Basis.

Will you also please answer the following:

When our company was organized, it was placed upon an assessment basis, i. e., whatever was necessary to pay expenses of the company was to be raised by assessment, not to exceed $12.00 per year. Now we have 410 stockholders, some in towns, some in rural districts. Our stockholders having business telephones in town, pay the same rate of assessment as rural subscribers, and also have the privilege of installing an extra telephone in residences in town by paying all expenses. This gives village stockholders two telephones for $6.00 per year, our assessment for 1908, while rural stockholders each have one telephone on a new party line, and pay us a $6.00 assessment. Is this just, and how can it be changed? Is there any legal objection to our amending our constitution, putting all stockholders on a rental basis so that village stockholders will pay a business rate, and rural stockholders will pay the rural rate; then pay back the dividends in cash to the stockholders and allow no preferential rates. Also would it be good business to include in the amendment, the right for any stockholder to surrender stock, and get a rental receipt covering the balance due him?

I will appreciate any suggestion you may offer to put our company on a business basis at our next annual meeting, which occurs soon.

Your present arrangement apparently does give village stockholders an advantage over rural stockholders. This arrangement does not seem just, and can be changed in the manner you outline. In fact, we believe that would be a very good solution of the difficulty. Giving a stockholder the right to surrender his stock and get a rental receipt for the balance due him would probably be a good business move, as it would reduce the number of stockholders entitled to dividends, and increase the number of subscribers. It would also have a tendency to sustain the value of your stock. If a stockholder knew that he could at any time surrender his stock and get a rental receipt in exchange, he would consider his stock worth par at all times. This ought also to facilitate the sale of new stock.

Labor Lien on Telephone Line.

Is the property of a small incorporated farmer's telephone company liable to foreclosure and sale for a lien on the property, due to the furnishing of labor and materials? And can a man to whom we are furnishing service, who built part of a line on which his instrument is located, make trouble for us in this way?

Please let us know what size claim he must have to enable him to foreclose, and any other information you can give us.

The property of a telephone line is liable to foreclosure and sale for a lien on the property just as would be a manufacturing establishment or business building. Vane vs. Newcombe, 132 U. S., 220. The fact that he is a subscriber and built part of the line on which his instrument is located would not effect his rights. There is no specified sum to which his claim must amount to enable him to foreclose. Of course he must have taken the proper preliminary steps to establish his liens, and these we advise you to have carefully examined by your local attorney.

Liability for Transmission or Delivery of Message.

The liability of a telephone company for negligence in the transmission or delivery of a message is determined by the following rules laid down in a recent case. A telephone company is responsible to the addressee of a message where he is the primary beneficiary in it, if the company is advised of that fact either by the terms of the message itself or otherwise. This liability does not arise out of any contract between the addressee and the telephone company because the only contract on the part of the telephone company is with the sender. The basis of the addressee's right is that the company, in the exercise of a public franchise, and in the performance of duties of a public character incident thereto, is liable to the public for the performance of those duties with reasonable care and diligence. If the addressee is not the primary beneficiary in the message, he must have some interest in it, and that interest must be disclosed by the terms of the message, or otherwise communicated to the company, to render it liable. When the request by a patron is for an office or the telephone of a particular person, the company has performed its whole duty when it has made connection with such telephone and it is not responsible for the identity of the person answering or the messages passing between them; but if it carelessly connects the patron with the wrong telephone and there is no contributory negligence on his part, it may be liable. But where the company contracts to produce at its office a certain individual to answer a long distance or any call, it is bound to exercise reasonable care to produce the proper person, and is liable to him for negligence in that regard if it had notice of his interest. McLeod vs. Pacific States Telephone & Telegraph Co., 95 Pac., 1009.

Uncertain Right-of-Way Grant Is Explainable.

A land owner possessed property on which a highway ran in a northerly and southerly direction, and on which another highway ran westerly therefrom, but not crossing it. The land owner executed a grant giving a telephone company the right to construct and maintain its line "over and along the property, * * * * including the necessary poles and fixtures along the roads * * * adjoining the property," and reciting that the consideration paid was in full payment for such right, and in full satisfaction "for the trimming of any trees along said lines necessary to keep the wires clear." When the land owner sued the telephone company for damages for the alleged unlawful erection and maintenance of the telephone line over his lands, the court held that the grant was uncertain in meaning as to the location of the proposed line, and that parole evidence of what the employe of the company, who located the line and obtained the grant, said to the land owner befor the execution of it in reference to the location of the line, was admissible to show what the parties meant by the language employed. The case is subject to appeal.

Morrison vs. American Telephone & Telegraph Co., 110 N. Y. S., 801.

Damages for Trimming Trees Unlawfully.

The measure of damages for the unnecessary cutting of trees, so as to substantially injure them by a telephone and telegraph company, under a grant of the right to construct its line over and along the premises and trim the trees thereon, is the difference between the value of the premises before and the value after the trees were cut and mutilated. So the Supreme Court of New York held in deciding a recent action brought against a telephone company. The written grant under which the company claimed was silent as to the precise location of the poles, their height, or the manner or particular place of crossing the premises. Under such circumstances the court held that oral proof of the surrounding circumstances of the making of the grant might be given. The admission of evidence that the agent of the telephone company had said that but one or at most two crossarms would be put up was held to be harmless, although at variance with the written grant, because it appeared that only one cross arm was actually put up. The case is subject to appeal.

Nichols vs. New York & Pennsylvania Telephone & Telegraph Co., 110 N. Y. S., 325.

Practical Questions and Answers

Telephoning from Moving Trains.

Will you please tell me through "Questions and Answers" why it is not possible (or practicable) to telephone from moving trains? What systems, if any, have been tried, and what obstacles have been found. I do not refer to "wireless systems," but metallic connection from one train to another, or to stations. Are there any books devoted to this subject?

As far as we know there have not been made any practical tests of telephoning from a moving train through metallic contact. That would involve a double trolley on the train bearing on two wires or other conductors along the track. It would be very difficult to secure and maintain a sufficient contact between the contact members on the train and the wires not to produce bad noises or even interruptions. It may not be impossible, but is not practical yet. There have been tests made of inductive schemes, but they have not been adopted. About two years ago someone tried to get financial support to exploit a device for telephoning through a jet of steam, blown against a wire run beside the track. Various other inventions of like value have been mentioned from time to time in the newspapers. As far as we know there is no book containing information on this subject.

TO WIRE CHIEFS AND MAINTENANCE MEN.

Clearing of troubles which occur in your exchange, inside or outside, may be made the subject of short, practical letters which will interest other telephone men These TELEPHONY *will gladly publish, if illustrated by diagrams or photographs. Simply write a description of the nature of the trouble, tests and location, cause found, and method of repair. Payment will be made for all letters published.*

A Resistance Problem.

Which of the lines *b* and *c* indicated in the diagram (Fig. 1) will have the greater resistance, as shown by bridge measurements from the end "*a*." Both lines are metallic circuits, of the same size and kind of wire, and are short circuited as indicated.

In the drawing, the line *c* will have the greater resistance when measured either from *a*, or from the other end. From points 1 and 2 in line *b*, the current has two paths, one through the 5 mile branch, and the other through that part of the main line beyond 1-2. The total resistance of these two branches is given by the formula: $\frac{R \times R'}{R+R}$ where R and R' are the respective resistances of the two separate branches. Assuming that the 5-mile branch is composed of wire having a resistance of 10 ohms per loop-mile of circuit, the total resistance of the branch, which may be represented by R, is $5 \times 10 = 50$ ohms. That part of the main line between the point where the branch taps on and the distant end is of the same length and size of wire as the branch, and its resistance, R', is also equal to $5 \times 10 = 50$ ohms. The total resistance across points 1 and 2 is then:

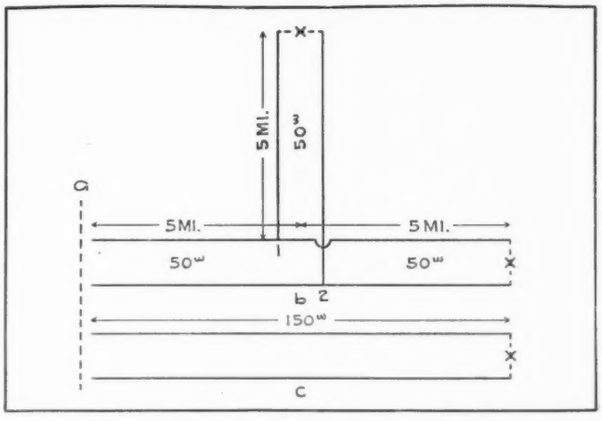

Fig. 1.

$$\frac{R \times R'}{R'+R} = \frac{50 \times 50}{50+50} = 25 \text{ ohms.}$$

This resistance is in series with that part of the line between *a* and points 1-2 (which is $5 \times 10 = 50$ ohms). Therefore the total resistance of the circuit is equal to $50+25+75$ ohms. The resistance of line *c* is simply $10 \times 15 = 150$ ohms.

Telephone Finances

Cuyahoga September Report Shows Continued Advance.

The following report shows comparative earnings, expenses and surplus of the Cuyahoga Telephone Co., of Cleveland, Ohio, for September:

	Sept. 1908.	Sept. 1907.	Increase.
Gross earnings	$69,249.03	$66,144.25	$3,104.78
Total expenses	31,357.61	35,044.43	*3,686.82
Net earnings	37,891.42	31,099.82	6,791.60
Interest on bonds	11,283.32	11,250.00	33.32
Surplus	26,608.10	19,849.82	6,758.28
Deductions from surplus:			
Dividend on preferred stock	7,186.75	7,186.75	.....
Dividends on common stock	.....	5,000.00	*5,000.00
Reserve for depreciation	3,253.92	1,250.00	2,003.92
Total deductions	10,440.67	13,436.75	*2,996.08
Net surplus	16,167.43	6,413.07	9,754.36

*Decrease.

Value of Telephone Property in Oklahoma.

The State Board of Equalization has completed the first assessment to be made against telephone companies operating in Oklahoma. The total valuations for 1908 as returned by it amount to $2,723,738, of which amount $2,276,471 is assessed against the Pioneer Telephone and Telegraph Company which operates without competition in the western and northern parts of the State. The next largest company is the American Telephone and Telegraph Company, which operates in the eastern part of the State in what was formerly known as Indian Territory. Its property is assessed at $62,355. The balance of the companies are all Independent and the majority of the 285 companies operate rural lines and small city exchanges ranging in value from less than $100 to several thousand in the large town exchanges.

Lincoln, Neb., Telephone Company Makes Good Financial Return.

A report filed with the Nebraska Railway Commission shows that, with a total investment of $780,488, the Lincoln Telephone Company received $128,900 net from its operation in the last year and after paying 6 per cent interest on its bonds and $1,151 dividends on its preferred

stock has a surplus of $27,543. The total surplus of the company is now $66,341, its bonded debt, secured by a first mortage on the plant, $583,000, and its value over three-quarters of a million.

The company operates both in Lincoln and Davey, having 5,381 instruments installed and in operation in Lincoln and 52 in Davey, making a total of 5,433.

The company expended $283,607 in new construction during the year.

Financial Paper Believes Abuse by Competitors Helps Independent Telephone Companies.

The following is an abstract of an editorial comment in the New York Financial World of Oct. 31:

"We seriously question whether the American Telephone and Telegraph Company, which controls through stock ownership, the Bell telephone companies, is benefited by the indiscriminate attacks so persistently made by the Boston News Bureau upon the Independent telephone companies and their securities. We rather think that its sincerity is openly brought into question by the excessive zeal shown by the Boston News Bureau in its behalf. The American Telegraph and Telephone Company, without any loss of prestige or detriment to the high opinion in which its securities are held by investors, could adopt the liberal attitude toward competitors taken, for instance, by the United States Steel Company toward its rivals. Competition is the life of business, and it is immaterial whether it be waged between powerful corporations and smaller competitors, or confined to small merchants.

"The American public wants fair play and a square deal. Its sympathies are always with the under dog, especially when its suspicions are aroused that he has not been given a fair show. We are very much inclined to think that the Boston News Bureau by making criticisms which deal in generalities and are strengthened by no specific facts, is defeating its own purpose and making friends instead of enemies for the Independent telephone companies. At any rate, their constant growth is the best proof that these attacks are not hurting them, and they do not appear to find any difficulty in raising the necessary capital for the extension of their systems. As they raise most of their money among local investors who have plenty of opportunity to study at close range the possibilities of their securities, the unfavorable prophecies from so distant a point of observation as Boston, are, to say the least, far-fetched. In the first place, local investors are quick to resent outside criticism of their business judgment. They are also prone to look upon it with the deepest suspicion, as being promoted by some ulterior motive. That there must be merit in the service of the Independent companies is self evident. Otherwise, how could the growth of these companies be explained? Even so, we fail to find how their existence has affected the business of the American Telephone and Telegraph Company, for according to the last annual statements of the latter, its earnings have increased in spite of the business depression that marked the major portion of its last fiscal year. We have good reason to believe that the American Telephone and Telegraph Company has not subsidized any one to champion its cause—a belief entertained by the Independent telephone companies—but is the unfortunate victim of well-meaning friends whose zeal is doing the company more harm than good."

Telephone News

Consolidation in Savannah a Bad Thing.

Consolidation of the competing telephone plants in Norfolk, Va., is being urged by the Bell company. A communication on the subject has been sent to the Industrial Commission of Norfolk by Thomas Purse, secretary of the Board of Trade, at Savannah, Ga., who, in effect, states that the consolidation of the telephone companies of that city, effected not quite a year ago, has brought about no noticeable improvement, but the rates have been increased almost 50 per cent.

His letter, in part, says: "Since then the rates of the Southern Bell Company have increased about 50 per cent. Previous to the consolidation the Bell company would put a telephone in your residence and one in your office for $60 a year. Now, for the same service, they charge $96. As to the service, I cannot see that there has been any improvement."

Improvements Will Better Independent Toll Service from Parkersburg, W. Va.

Representatives of the West Virginia Western Telephone Company of Parkersburg, the Home Telephone Company of Coolville, Ohio, the Home Telephone Company of Athens, Ohio, and the Home Telephone Company of Pomeroy, Ohio, have signed a toll contract whereby there is to be an extension of the Independent telephone lines in Ohio that will result in better through service with Parkersburg.

The contract entered into provides for a considerable amount of new construction to be done principally by the Coolville, O., company. This construction will connect Coolville with Athens on one side, Pomeroy on the other, and Parkersburg in the third direction.

When the work has been completed Parkersburg will have through telephone service to Columbus and a better and more direct service to Point Pleasant. The total cost of this new construction, it is said, will be nearly forty thousand dollars.

According to the contract entered into by the different companies the work on this new construction is to be started before ninety days have elapsed.

Scandalous Competition Charged in Detroit.

In a bill of complaint filed in circuit court at Detroit, Mich., on November 9, the Home Telephone Company accuses its competitor, the Michigan State Telephone Company (Bell) of using unfair means to impede its progress.

The bill recites that after the Home company incorporated the Michigan State company, through its officers and agents, circulated damaging reports that it would not establish the plant, that it would not begin operations and that the company was on the verge of insolvency. It charges the Michigan company's agents with inciting John Hanley to drive through the streets with big signs advertising four liens on the Home Telephone building for sale, although these liens were, it is said, filed because of claims not based upon actual delivery of corresponding value.

Since the Home company has arrived at a basis where it can collect rentals from its subscribers, the bill of complaint charges, the alleged persecution has taken the form of seeking to induce subscribers to discontinue, by making false statements and by other means. In this it declares,

Arthur Von Schlegel, contract agent, and George Haywood, his assistant, have been most active, to the extent of employing a corps of 60 men to make a canvass of the subscribers and try to get them to break their contracts.

Judge Donovan issued a temporary injunction restraining the Michigan State company and its representatives from pursuing any such methods as those alleged.

Newspaper in Jackson, Miss., Calls Competition an Accelerator of Development.

The *News* of October 25th, issued at Jackson, Miss., tells of an alleged project of the Cumberland Telephone & Telegraph Company to build a new long-distance line between Jackson and Hattiesburg, Miss., which, according to the official announcement, is part of an improvement scheme for the southern Mississippi territory which is expected to cost about $100,000.

The newspaper report shows that the transaction of business between Jackson and points in southern Mississippi has been considerably handicapped by lack of long distance telephone facilities, and the Home Telephone Company, of Hattiesburg, recently announced a plan to build a long distance line between that place and Jackson.

The *News* states that "The Cumberland was no doubt accelerated in making this improvement by the announcement that the Home Telephone Company was to build."

Important Features of the Convention

December 1, 2 and 3 are dates—only ten days distant—which are being looked forward to with the greatest eagerness by every Independent telephone man in the country. There is no doubt but that this year's convention will be the most interesting, and that its proceedings will convey more substantial benefits to the Independent movement, and to the telephone men who attend, than has been possible in any previous year.

Secretary Ware, and the other officers of the Association, have been unsparing of themselves in their diligent work to put the plans in order, and they have received the co-operation of the leaders in all parts of the country.

The program of the convention will be published in next week's issue of TELEPHONY, which will be distributed in the convention hall of the Auditorium, or may be obtained at TELEPHONY's headquarters (to which all our readers are invited to come, and meet the attending members of our staff). The following is an outline of the main features of the program:

Monday, November 30, will be devoted to meetings of the Executive Committee, the Advisory Board, and other committees.

FIRST DAY'S SESSION.

Tuesday, the first day of the convention, will witness most important proceedings. After the Mayor of Chicago delivers the welcoming address, Dwight E. Sapp, of Mount Vernon, O., who is known as one of the most able speakers who has ever addressed a telephone convention, will make the response. Acting President P. C. Holdoegel, of Iowa, has prepared an address containing some strong features which are sure to attract much attention. Secretary Ware, in spite of the enormous amount of work he has been doing to further the interests of Independent telephony in matters of publicity, litigation, and other important projects, has found time to prepare a report which will help us all to understand what the Independent telephone business means, and what a great benefit to the field is the work of the Association.

CONFERENCES OF PRACTICAL MEN.

At 2 o'clock, and again at 8 P. M. on Tuesday, there will be sessions of the conferences on technical and practical matters, in charge of Mr. G. R. Johnston. Papers will be handed in on the following subjects:

"Standardization of Certain Instruments," Gerald Deakin, San Francisco, Cal.; "Economic Development of Toll Territory," Frank F. Fowle, Chicago; "Transmission," A. C. Morse, Cleveland, O., electrical engineer Cuyahoga and U. S. Telephone Companies; "Handling Trouble," J. P. Boylan, Detroit, Mich.; "Increasing Toll Traffic," C. E. Tarte, general manager Citizens' Telephone Company, Grand Rapids, Mich.; "The Telephone Engineer in His Relation to the Business," Roy Owens, electrical engineer Columbus Citizens' Telephone Company, Columbus, O.; "Cost of Collecting Rentals and Tolls," L. E. Hurtz, general manager Lincoln Telephone Company, Lincoln, Neb.; "Phantom Circuits," C. Ewing, Buffalo, N. Y.; "Comparative Statements," W. A. Prince, Philadelphia, Pa.; "Economies in Handling Maintenance Men," J. H. Ainsworth, general manager Home Telephone Company, Dayton, O.; "Local Traffic," A. J. Shands, St. Louis, Mo.

Every one who has had experience leading him to a definite conclusion in respect to any one of these subjects, or any branch of them, is invited to participate in discussion. It is requested that, so far as possible, experiences on such matters as the cost of collecting rentals and tolls, insurance, etc., be reduced to writing and handed in to the committee before the meeting.

SECOND DAY'S SESSION.

At 10 A. M. the meeting will open with the roll call of states, which will show just where the Independent telephone movement stands, and it is expected that this will be, as it has been in previous years, one of the most interesting and valuable features of the convention.

The balance of this day's session will be given up to addresses and discussions of subjects of the greatest practical value to the Independent telephone movement, and to every owner or manager of telephone property. In the morning session the subject of "Depreciation" will be discussed by a committee which has been preparing a report on this matter. The report will be presented by Mr. W. Roy McCanne, of Rochester, N. Y. Mr. G. R. Johnston will give a summary of arguments relating to the value of competition. Mr. W. R. Barkdull, of Windsor, Mo., whose experience in conducting district meetings has been of the most valuable kind, will tell just what these mean to the companies who attend, and how they can be made of the greatest use. Prof. Morgan Brooks, of the University of Illinois, a scientist of national reputation, will present a most interesting paper under the title, "Some Telephone Problems." Mr. Jas. B. Hoge, of Cleveland, for-

ATTEND THE

Independent Telephone Convention

Chicago, December 1, 2 and 3, 1908

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A Reminder Distributed by the International Independent Telephone Association

merly president of the International Independent Telephone Association, will present a summary of his investigations into insurance forms and rates offered to various telephone companies throughout the country. Every manager or officer of a telephone company is particularly requested to come prepared to give the experience of his company on this subject, in order to make the discussion of the utmost value. Reports should be written out so that all may be printed if there is not time to present them verbally.

Other important papers in the morning session are "Organizing Workers to Build Good Business," Jas. H. Shoemaker, Waterloo, Ia., president Iowa Independent Telephone Association, and "Relation of the Exchange Owner and Operator to the Manufacturers and Supply Dealer," by Chas. W. Emmer, Beaumont, Texas.

SECOND DAY—AFTERNOON SESSION.

At 2 P. M., Wednesday, the report of the Finance Committee will be presented by Jas. S. Bradley, Jr., of Toledo, O. This will show the great amount of money which has been raised as a working fund to further the Independent telephone movement, and how this is being used for the advantage of the Independent telephone business all over the entire country.

In his address, "The Legal Status and Relationship of Independent Telephone Companies," Mr. A. C. Lindemuth will outline some important studies of the laws which affect relations of Independent telephone companies to one another and to the public.

In his paper on "The Past and the Future," Mr. H. D. Critchfield, president of the Wisconsin Independent Telephone Association, well known as a man who has for years been in the midst of all the larger movements for the advancement of Independent telephony, will discuss the growth from a few scattered companies into a great system, and show how this expansion is likely to continue and what will be the outcome of important work now being carried on.

Other papers of great practical value are: "The Financial Problems," George H. Raymond, treasurer Consolidated Telephone Company, Buffalo, N. Y.; "Cause and Prevention of Damage Suits," W. S. Hart, attorney, Waukon, Ia.; "Advantage of Legislative Restriction of Free Service," J. B. Earle, Waco, Texas.

Time will be allowed for the discussion of each paper after its presentation.

THE BANQUET—WEDNESDAY NIGHT.

This year's banquet will be distinguished by a most remarkable group of speakers who are prominently identified with important Independent work now being carried on by the International Association, and the representative interests of various states. Every one is looking forward to the talk by Clarence Brown, of Toledo, O., who was engaged in the successful prosecution of the Delphos and Marion, Ohio, suits which have done so much to strengthen the position of Independent telephony in that state. Others are: Judge C. M. Showalter, of Parkersburg, W. Va., a noted speaker from the state where brilliant speeches are always expected; S. T. Neil, a well-known telephone man from Missouri; Martin W. Littleton, of New York, who has been actively engaged in the efforts to open that city to telephone competition; John H. Wade, of Jamestown, N. Y., a leading attorney and president of one of the most progressive telephone companies. Mr. H. M. Daugherty, of Columbus, O., a candidate for the Senate, and a gentleman with all qualifications to suit him for the important place, will act as toastmaster.

Ladies are invited to attend this banquet. Through the generosity of the number of friends of the Association, the price of tickets will be but $2.00.

THIRD DAY'S SESSION.

Opening at 10 A. M., on Thursday, the third day's session is promised a most favorable start, as the speaker is Mr. C. E. Wilson, of Philadelphia, general manager of the Keystone Telephone Company. His subject, "Pernicious Political Pull," gives an opportunity for a talk which will appeal to every active man from start to finish.

Mr. E. B. Fisher, secretary of the Citizens' Telephone Company, of Grand Rapids, Mich., will speak on "A Strong Financial Policy." Mr. T. S. Lane, of Butte, Mont., who has been so successful in establishing a great Independent telephone system in that state, will tell his experience with "Local Investors as Business Boosters." The business of the Association will occupy a large part of this day, the following meetings and proceedings being scheduled:

Committee on Amendments; Committee on Resolutions; Other Committee Reports; Unfinished and New Business; Committee on Nominations; Election of Officers; Other Committee Reports; Miscellaneous Business; Adjournment.

EXHIBITS BY MANUFACTURERS.

The manufacturers have shown their confidence in the immediate future growth of the business by bringing out a number of new inventions, some of which are of most far reaching importance and of exceedingly strong interest. Some of these devices will be described in next week's issue of TELEPHONY, while others can only be learned about at this early date by visiting the convention itself. In any event, this feature alone will be worth the trip to almost any progressive telephone man.

The manufacturers will be represented, as usual, by their best engineers, who will be glad to give their experience on practical subjects to all inquirers. Among the important firms which have engaged rooms are the following:

Illinois Electric Company; Homer Roberts Company; Swedish-American Company; Manhattan Electric Supply Company; Monarch Telephone Manufacturing Company; The Vote-Berger Company; Automatic Electric Company; Telephony Publishing Company; Chicago Telephone Supply Company; Century Telephone Construction Company; Westinghouse Machine Company; Dean Electric Company; F. W. Pardee; S. H. Couch Company; North Electric Company; Stromberg-Carlson Company; Warner Electric Company; Cracraft, Leich Electric Company; White City Electric Company; Miller Anchor Company; Iowa Association Headquarters; Holtzer-Cabot Electric Company; Indiana Steel & Wire Company; H. S. Green Battery Company; Electric Appliance Company; Sterling Electric Company; American Electric Telephone Company; Frank B. Cook Company; Ohio Brass Company.

The names of all exhibitors, with their room numbers, will be given in the convention number of TELEPHONY. Every visitor to the convention is especially invited to call at TELEPHONY's headquarters, Room 618, and obtain, without charge, a copy of the convention number of the paper, which will give all the important news of the meeting, including a full program.

CARFARES.

In past years the delegates to the convention have been able to obtain reduced railway rates. This year special rates for the convention are not granted by any passenger associations, because the regular fares to Chicago, from the greater part of the territory, already have special rates which may be obtained on return tickets, making the basis about 2 cents per mile, a rate as good as has been given as a special concession in other years.

RECOMMENDATIONS FOR COMMITTEE MEN.

Officers of state associations who have not yet sent in recommendations for committee men, are requested to telegraph them immediately to Secretary Ware, of the International Association, Monadnock Block, Chicago. It is essential that this be done in order that the list may be published in the program, which is now being made up for the printer.

Meeting of Fifth and Sixth Ohio District Associations.

Delegates to the number of sixty attended the joint meeting of the Fifth and Sixth districts of Ohio in Dayton on Nov. 6. The meeting was presided over by J. H. Ainsworth, general manager of the Home Telephone Company, of Dayton. It was one of the most profitable meetings in the history of either district.

Reports were made showing that there are approximately 38,000 Independent telephones in the two districts and that 1,742 stockholders were represented in the meeting. Addresses were made by President Frank L. Beam, of the Ohio Association, James S. Brailey, Jr., president of the United States Telephone Company, C. Y. McVey, G. P. Thorpe, W. A. Clay Houston, Stacy Rankin and D. C. Warner.

Frank Hughes, of Hamilton, was elected delegate to the National convention in Chicago Dec. 1-3, and George Kratzer, of Mt. Oreb, alternate representing the Fifth district, and J. H. Ainsworth, of Dayton, delegate and R. W. Boyd, London, alternate representing the Sixth district.

For the Fifth district S. H. Allen, of Oxford, was elected vice-president and L. A. Miller, of Darrtown, secretary, for the ensuing year. In the Sixth district J. H. Ainsworth, of Dayton, was elected vice-president and A. R. Pollock, of Piqua, secretary.

Delegates to the Ohio Independent Telephone Association Convention were elected as follows:

Fifth District—Harry E. Parker, Georgetown, O.; W. H. Baum, Batavia, O.; W. G. Thompson, Hamilton, O.; L. A. Miller, Darrtown, O.; J. McCray, College Corners, O.; F. H. Hughes, Hughes Station, O.; S. H. Allen, Oxford, O.; John Hutchinson, Oxford, O.; William Cook, Morning Sun, O.; Chas. E. Biehn, Georgetown, O.; George Kratzer, Mt. Oreb, O.; S. M. Douglass, Morning Sun, O.; D. C. Warner, Higginsport, O.; Eugene Hugh, Hamilton, O.; F. M. Barden, Hamilton, O.; E. E. Williams, Oxford, O.; Wm. Iles, Batavia, O.

Sixth District—O. R. Krickenberger, Greenville, O.; C. R. Lestwich, Greenville, O.; W. D. Rush, Greenville, O.; A. R. Pollock, Piqua, O.; Henry Allen, Troy, O.; W. W. Fisher, Bellefontaine, O.; H. M. Allen, Bellefontaine, O.; C. H. Marvin, Urbana, O.; R. H. Murphy, Urbana, O.; J. H. Ainsworth, Dayton, O.; L. H. Thedieck, Sidney, O.; L. M. Flesh, Piqua, O.; John T. Barlow, Dayton, O.; Dr. Mills, New Lebanon, O.; A. L. Seeley, Plain City, O.; Calvin Leggett, Plain City, O.; D. O'Dell, Springfield, O.; Jacob House, Jackson Center, O.; L. M. Studevant, Sidney, O.; A. J. Hess, Sidney, O.; W. H. Wagner, Sidney, O.; S. G. Truimdull, Cedarville, O.; W. J. Pence, West Jefferson, O.; M. J. Meech, London, O.; R. W. Boyd, London, O.; S. A. Mosby, Phillipsburg, O.; H. C. Kiefaber, Dayton, O.; Harry Canby, Dayton, O.; Jno. Zeeck, Mt. Sterling, O.

Indianapolis Telephone Agitation Renewed.

The question of granting a new and modified franchise to the New Telephone Company, of Indianapolis, and the ratification of the act of the Board of Public Works in signing such franchise, is again being agitated. The question was to have come before the council last Monday night, but for want of a quorum the consideration went over until the next meeting.

L. G. Richardson, president of the Central Union Telephone Company, renewed his proposition to purchase the property of the New Telephone Company and to provide for toll connection with the Independent toll lines. It is reported that the officials of the New Telephone Company will not consider the proposition at all and announce that the Central Union cannot buy the property at any price.

This announcement brought out a rejoinder by Prosecutor Hooton, who says he will proceed at once to push the suit to dissolve the contract giving the Indianapolis Telephone Company possession of the New Telephone Company's property, and to enjoin the two companies from entering into the benefits of the proposed new franchise. This suit is pending in the Lebanon Circuit Court on change of venue. There is nothing likely to come of it.

Iowa Independents May Spend $6,000,000 in Improvements Next Year.

A most important announcement relative to the progress of Independent telephone companies in Iowa, is that made in Des Moines recently in an interview with a representative of the Des Moines *Register and Leader* by Mr. P. C. Holdoegel, formerly president of the Iowa Independent Telephone Association, and now acting president of the International Independent Telephone Association.

Mr. Holdoegel refused to comment directly on the rumor that the competitor of the Independents will spend $1,500,000 in the coming year. He did say, however, that the indications are that the 4,000 Independent companies of the state will expend a total of not less than $6,000,000 for improvements within a year.

This is a conservative estimate, as may be seen from the progress in building new Independent exchanges at Marshalltown, Prairie City, Rumells and Mitchellville. On each of these plants many thousands of dollars will be spent. An expenditure of more than a million dollars for Independent toll lines is contemplated.

Independent Telephone Company Commended for Excellent Election Service.

The day after election, the Utica (N. Y.) Press published the following:

"Splendid work was done by the Home Telephone Company in collecting the returns in Oneida county in detail for the Press. Its service was prompt and accurate. The agents and operators of the company all displayed commendable interest and intelligence in their several duties. The work was all done under the efficient supervision of Frank S. Judson, whose years of experience in it has made him an expert. It is a tremendous undertaking to cover all the districts in the county, as some of them are quite remote."

Growth of Subscribers' List at Grand Rapids, Mich.

The Citizens' Telephone Company of Grand Rapids, Mich., has been sending out about 10,000 copies of the 25th edition of its local exchange directory. This directory will show continued and satisfactory growth, the net increase since the last edition being 168 telephones and since the installation of the automatic service, January 9, 1904, 4,326 telephones. The 24th edition showed 9,761 names of subscribers and this edition will show 10,069. There has, in fact, been growth in all parts of the state. A considerable addition to long distance service has been made, marked progress in the development of the new plant in Detroit is observable and work on the building and system of the Citizens company at Lansing is nearing completion.

Rates Reduced on Account of Discrimination.

The Oklahoma corporation commission has issued an order restraining the Purcell and Lexington Telephone Company from charging its customers more than $1.00 for residence telephones, and $1.50 for business telephones. The order was issued after a hearing upon complaints filed by Lexington and Purcell, parties alleging discrimination in rates. It was shown during the hearing that the company was charging $1.50 to some of its customers for residence telephones and $2.00 for business telephones.

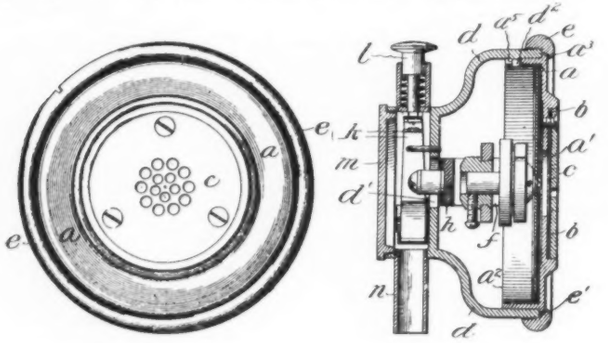
Telephone Patents

Conducted by Max W. Zabel

TELEPHONE TRANSMITTER.

G. F. Atwood, East Orange, N. J., patent 902,043, Oct. 27, 1908.

A transmitter designed especially for military out-of-door use is described in this patent. It consists of the casing *d*, having the front plate *a*, and the central aperture *a'*, over



which is placed the mouthpiece *c* and between which and the plate *a* is a water-proof membrane.

The transmitter parts *f* are mounted in the transmitter cup. The members *a* and *d* are held together by the locking ring *e*, so that no moisture can enter where they join.

The contact posts *d'* are mounted so that they are accessible and yet not susceptible to moisture. The push-button *l*, closes the circuit through the transmitter when it is desired to see the transmitter.

TELEPHONE AND FIRE ALARM SYSTEM.

C. E. Buell, N. Plainfield, N. J., patent 903,153, Nov. 3, 1908.

This patent is designed to provide means for sending signals to a central telephone station when a local nozzle of a sprinkler system has opened, and also to provide means for sending the alarm to the central telephone station over the telephone circuit when the valve which controls the flow of water to the sprinkler system has been moved from its full open position.

MOUTHPIECE ATTACHMENT FOR TELEPHONES.

J. W. McBrine, Medford, Mass., patent 902,896, Nov. 3, 1908.

An antiseptic mouthpiece for attachment to the telephone transmitter is the subject of this patent, and consists of two rings, one adapted to fit into the other. Over the smaller ring, a fine tissue paper is placed, and the larger ring superposed to hold the tissue paper in place. The combined rings and tissue paper covering are then inserted over the flaring end of the transmitter mouthpiece.

TRANSMITTER HINGE.

J. S. Birsfield, Chicago, Ill., patent 902,642, Nov. 3, 1908.

A completely enclosed and dust-proof transmitter knuckle is described in this patent. It consists of a movable member having a spherical convex surface which is cut away to leave two diametrically opposite projections lying within the sphere of the surface. Another fixed member engages the projections of the movable member. This arrangement provides a completely enclosed chamber, through which the transmitter cords can pass.

SELECTIVE SIGNALING DEVICE.

Ira F. Manny, Milwaukee, Wis., patent 902,099, Oct. 27, 1908.

The step-by-step selective signaling system described in this patent, consists in having a motor detained by a magnetically controlled pawl, which when released by the first signal from the signaling station starts the mechanism in operation. An electrical contact on a rotatable member is brought into contact with a signaling member to complete the signaling circuit.

TELEPHONE SIGNALING SYSTEM.

Paul F. Smith, Lyons, Kan., patent 902,338, Oct. 27, 1908.

This step-by-step signaling system consists of a dial at each telephone subscriber's station, and a controlling fixed dial at the central station. Each of the subscribers' dials differs in arrangement of contacts from the others. The energization of a called circuit at a particular point in the operation of the subscriber's dial will energize only that called circuit in which the particular subscriber's dial is arranged to present a proper contact. An actuating and a locking relay in connection with a pawl and escapement mechanism suitably operated from the central station are the features of the invention.

TELEPHONE SYSTEM.

H. G. Webster, Chicago, Ill., patent 902,930, Nov. 3, 1908.

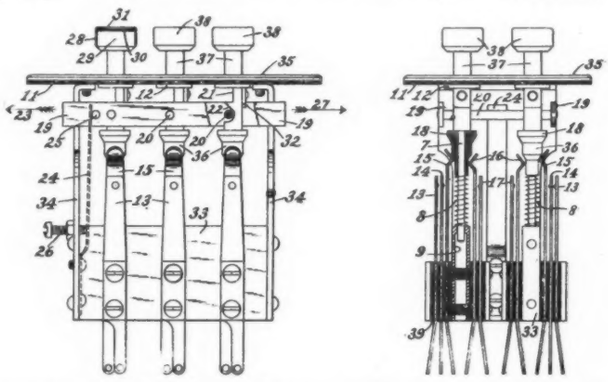
It is designed in this invention to reduce the number of line relays which are necessary in a telephone exchange. Generally, the invention has line relays which control several lamps, the connection of the line relays being in multiple and according to a certain combination, with the line conductors entering the exchange. Each pair of line conductors entering the exchange is given a numeral 1, 2, 3, 4, etc. The tip line conductors are connected respectively to one set of relays, and the sleeve conductors are connected to another set of relays.

Each lamp requires the simultaneous actuation of one of the tip and one of the sleeve relays for its operation.

BANK OF LOCKING SWITCH KEYS.

E. R. Corwin and Charles A. Bals, Chicago, Ill., patent 902,275, Oct. 27, 1908.

A selective key for intercommunicating systems is covered by this patent. It has the various plungers 31, 38, 38, each plunger provided with a spring actuating member 36. The plunger 38 and the member 36 are united by the nonmetallic



member 21, which is suitably recessed to receive the pin 20, mounted on a sliding strip, 19.

When the button is in the position to engage the pin 20 as shown in the illustration, it closes a circuit through the springs 15, 16, 14 and 17 for talking purposes, but does not make contact with the ringing spring 13 until the button is further depressed.

TELEPHONE SUBSTATION SET.

J. S. Birsfield, Chicago, Ill., patent 902,641, Nov. 3, 1908.

This invention pertains to the construction of metal telephone sets. The set consists of a sheet-metal casing, which contains the necessary telephonic appliances.

TELEPHONE REPEATER.

L. A. Lindsey, Crystal Springs, Ga., patent 901,974, Oct. 27, 1908.

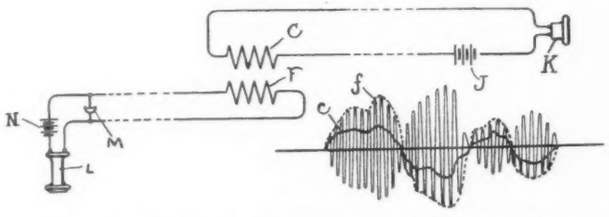
This telephone repeater consists of a carbon carrying cup provided with suitable electrodes and comminuted carbon. These electrodes in association with a battery and induction coil, retransmit the current that comes into the repeater. A suitable nonmagnetic diaphragm, used for the transmitter portion, carries a movable coil, which is operative between the poles of a magnet having a suitable energizing coil.

TELEPHONE RELAY.

E. F. W. Alexanderson, Schenectady, N. Y., patent 902,195, Oct. 27, 1908.

A telephone relay which is to be used for long distance transmission purposes is described in this invention, and consists in the use of an ordinary inductor-alternator, having the field and armature windings stationary, the rotor being the only moving part.

Laminated construction of the pole pieces is used, so that



the field winding *C* and the armature winding *F* will repeat and amplify voice currents.

In the illustration the curve *f* indicates the frequency of the armature currents. The frequency of these currents is so high as to be inaudible in a telephone receiver, and as shown in the illustration is considerably higher than the frequency of the voice currents which are designated by the line *c*. When the current through the field windings is increased, as when talking, the frequency of the armature current is not changed, but the amplitude of the current induced in the armature, which is retransmitted over the winding *F* to a suitable receiver is changed.

TRANSPOSITION BRACKET FOR INSULATORS.

Jas. E. Skinner, Kingman, Kan., patent 902,455, Oct. 27, 1908.

The transposition bracket for insulators described in this invention consists of two metal arms, each having a center hub. The center hubs are superposed, one above the other, and mounted on a cross-arm in such a way that the arms extend radially in four directions. Insulators are placed on pins which are placed at the ends of the arms. The brackets are prevented from rotating by projections on their hubs.

CABLE SUPPORT.

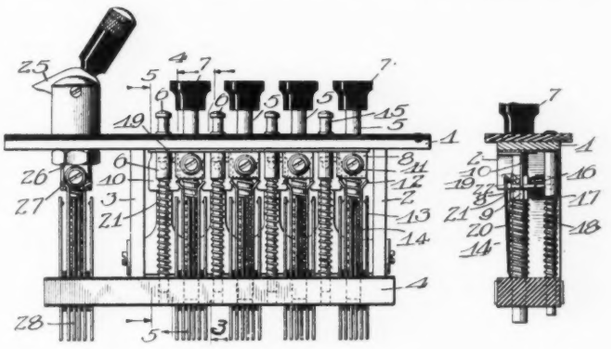
Elbert A. Hawkins, Baldwin, N. Y., patent 901,706, Oct. 20, 1908.

This invention consists in the provision of a suitable cable support for a multiple switchboard. The device consists of a supporting-bar on which is mounted an angular member, which is provided with means to prevent its rotation. Normally the bar is held securely to support the cables but can be removed if desired.

FOUR PARTY LINE INDICATING RINGING KEY.

C. S. Winston, Chicago, Ill., patent 902,356, Oct. 27, 1908.

A four-party selective signaling key is covered by this patent. It consists of the supporting plate 1, which carries suitable plungers 7 for actuating the springs. In association with each of the plungers, 7, is an auxiliary plunger 5, the



upper extensions, 15, of which are normally above the plate 1.

When one of the buttons 7 is depressed, it carries along the auxiliary plunger 6, which remains in its depressed position, due to the spring 20, while the button 7 returns to its normal position. This auxiliary plunger 6 thereby indicates which key was last used. When another button is depressed, the first auxiliary plunger is released.

MICROPHONE APPARATUS FOR TELEPHONE AND OTHER CIRCUITS.

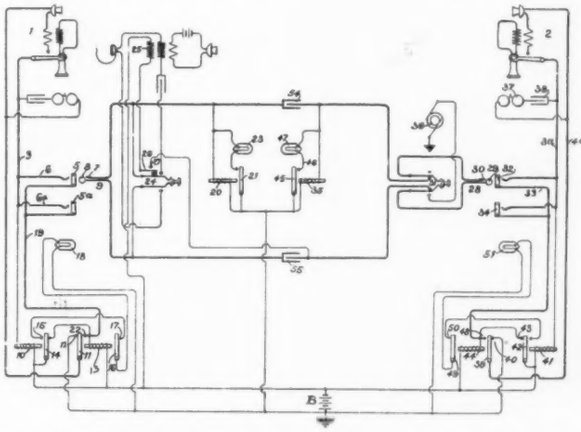
Q. Majorana, Rome, Italy, patent 901,977, Oct. 27, 1908.

The transmitter of this invention consists of a mouthpiece which opens against a diaphragm securely attached to a nozzle from which issues a liquid stream. The frequency of the drops emanating from the nozzle depends upon the size and construction of the orifice, and the character of the liquid used. By this construction it is claimed that the telephone currents are much stronger than those obtained from the ordinary transmitter.

TELEPHONE EXCHANGE SYSTEM.

E. R. Corwin, Chicago, Ill., patent 902,715, Nov. 3, 1908.

A common battery telephone system using a two-conductor cord-circuit is shown in this patent. It consists of the ordi-



nary substation equipment, in combination with the impedance coils 35 and 41, which feed current to the line for talking purposes. The control of the relay 44, and its novel arrangement with the line-lamp 51 are particular features of the invention; likewise the connection of the armature 42 under the control of the impedance coil 41. The circuit is simple, and can be readily followed.

TELEPHONE SYSTEM.

J. A. Geller and S. H. Geller, Chicago, Ill., patent 903,561, November 10, 1908.

The lock-out telephone system which is the subject matter of this patent, has a rotatable contact carrier, having a contact thereon which connects with the receiver circuit. It has a second elongated contact for connection with an operating circuit, and another contact point immediately following the elongated contact for connection with the ringing circuit. There are stationary contacts, normally co-acting with the first two movable contacts, and a second stationary contact for the receiver circuit, arranged for co-action with the receiver contact when the ringing circuit movable contact is in association with its stationary contact.

RELAY FOR REINFORCING SOUND.

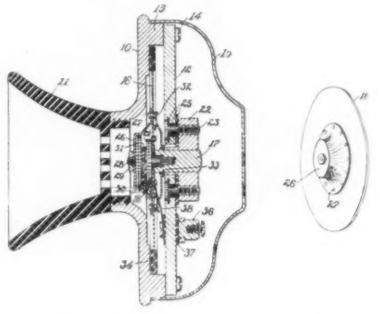
J. H. Christensen, Sövejen, Sölleröd, Denmark, patent 903,811, November 10, 1908.

A new telephone repeater is here shown, which consists of a diaphragm actuated by a magnet which receives the incoming currents which are to be repeated, and it is claimed amplifies them. The diaphragm has a central electrode against which a pivotly mounted carbon-electrode impinges under slight pressure. The amount of pressure is adjustable. The carbon-electrode is suspended by a pendulum agitated, as by the incoming currents, it changes the resistances between the centrally located electrode of the diaphragm, and the movable electrode, and this, it is claimed, amplifies the outgoing currents.

TELEPHONE TRANSMITTER.

W. Kaisling, Chicago, Ill., patent 903,197, Nov. 10, 1908.

This transmitter, it is claimed, has a new construction not hitherto used. The diaphragm is fastened at its periphery, and the central portion of the diaphragm is also rigidly fastened. A carbon carrying cup is fastened to the diaphragm intermediate of its center and its periphery, at what is claimed its vibrating point of greatest amplitude.



In the illustration, the diaphragm 16 is held at its periphery in the casting 10, and the bridge 12 of the transmitter holds the central portion of the diaphragm through the agency of the electrode which is screwed into the lug 17, in order to provide an initial flexure of the diaphragm, is adjustable in the bridge. The carbon cup 26, is fastened to the transmitter by means of the rivets 27, and carries the granulated carbon.

In the Manufacturing Field

Making Extension Sets Attractive.

Operating companies are pretty well agreed that the installation of as many extension sets as can be placed in residences is a good proposition. At the customary rates, the return on the investment is sufficiently satisfactory to make this class of service worth going after. For this reason methods of interesting subscribers in extension set service are frequently discussed among telephone men, and the news that the Stromberg-Carlson Telephone Manufacturing Company has made an important contribution to the literature of this branch of the business has created considerable interest.

The company's advertising manager, Mr. H. C. Slemin, devised four two-page folders, each of which bears one of the illustrations reproduced upon these pages. These are being distributed to the company's customers desirous of increasing their extension set installations.

Some of the Illustrations Used by the Stromberg-Carlson Telephone Mfg. Co. to Advertise the Uses of the Extension Set.

These four folders contain arguments applying to various typical situations likely to be met by the canvasser. In fact they act as the canvasser's advance agent, getting the

subscriber who receives them into a frame of mind where he is most willing to take up the subject. The following are pointed sentences taken from the folders:

"The butler, the cook, the gardener, in fact any employe of your household appreciates a modern convenience that assists in giving you better service."

"An extension telephone will save just as much running around on the part of these servants, as in any business establishment where a house telephone is considered indispensable."

The Extension Set in Milady's Boudoir.

"It saves time at every turn and if 'time is money' to anybody, it is to the members of the household who transact the details of your home life."

"How natural to telephone a neighbor when it pleases you to talk, but how inconvenient when you realize that the instrument is downstairs."

"Have an extension telephone located where it will serve you conveniently at all times—it's a comfort then."

"There is some advantage in being able to feel entirely at ease when upstairs, that you will not be required to run downstairs or call someone else, usually not about, to answer the telephone."

"The extension telephone in the home lengthens the day by shortening the time required for the various occupations in managing its business and social affairs."

The general design, typographical arrangement, quality of paper used, printing and other details of these folders are such as to make them extremely attractive and thoroughly adapted to serve their purpose and draw the favorable attention of the class of people most likely to become users of extension sets.

The Stromberg-Carlson company is sending samples to telephone managers who are likely to wish to try the plan.

Mr. C. H. Spotts, formerly manager of the paint department, and Mr. Walter F. Swearer, assistant at the general offices of the Joseph Dixon Crucible Company, Jersey City, are now associated with The Protectus Company, Philadelphia and New York., paint makers, in the capacities of secretary and New York manager respectively.

New Bulletin of Cracraft, Leich Electric Company.

The Cracraft, Leich Electric Company is coming to the front not only as a manufacturer of telephone apparatus of acknowledged ability, but as a concern which knows how to set forth the merits of its goods attractively on paper. This is proved by a recently issued Advance Bulletin on magneto telephones, the Cracraft, Leich transmitter, receiver and induction coil, lightning arrester, hook switch and a new generator which has just been put upon the market. Clear descriptions of the apparatus are assisted by well made illustrations.

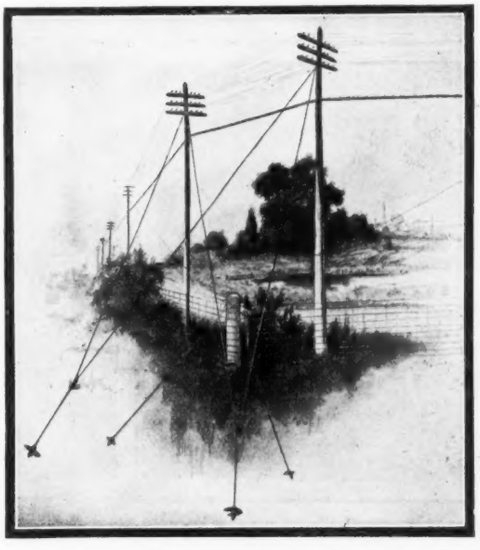
The book gives information of the sort which a practical telephone man wishes to have. That it should do so is to be expected by all those who are familiar with the ability and experience of the members of this firm and its staff of telephone men, who are experts in various departments. However, it is safe to predict that this book will find its way into the hands of many persons who have not hitherto been in close touch with the work done by this firm, and by whom it is sure to be considered worthy of attention.

Mr. W. C. Church, of the W. C. Church Lumber & Coal Company, Des Moines, Iowa, a well known pole dealer, has recently become interested in a new primary battery which is now being manufactured by The Battery Company, of Milwaukee. Mr. Church has taken the agency for this company in Iowa and has recently been conducting an exhibit of the new apparatus in his home city.

The Matthews' Anchor.

The well known Matthews' anchor, formerly known as the Stombaugh anchor, has recently been brought to the attention of telephone men in a new way by the distribution of a little leaflet bearing the title, "More About Burial Expenses." The leaflet shows the method of guying corner telephone poles. A graphic representation showing the method of entering the ground, the conical form of resistance when a strain is applied, and also the formula for finding the holding power of the anchor are also given.

It is said that a crew of three men can anchor a pole in 15 to 20 minutes with a Matthews' guy anchor. While two of the men are screwing in an anchor, the third is attaching the guy wire to the pole, putting the thimble through the eye of the anchor and has his block and tackle



Methods of Guying Corner Poles with the Matthews Anchor.

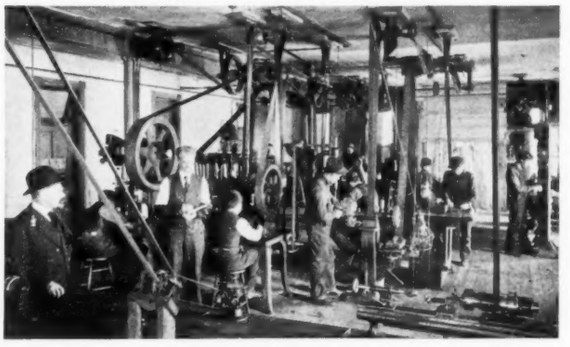
for the helping hands of the other two men at the same time they finish boring in the anchor. The eye is then attached to the end of the anchor rod, and the guy wire pulled up tight to the anchor.

The fastenings are made quickly and the men are off to anchor the next pole inside of 20 minutes.

The Interstate Electric & Manufacturing Company.

About two years ago, the officers of the Interstate Supply Company, of Sioux City, Ia., organized an auxiliary company under the name of the Interstate Electric and Manufacturing Company for the purpose of developing and manufacturing a new line of telephone apparatus, marketing, of course, the products of the factory through the Interstate Supply Company, which was established in 1900 and which has been doing a successful jobbing business in telephone supplies ever since.

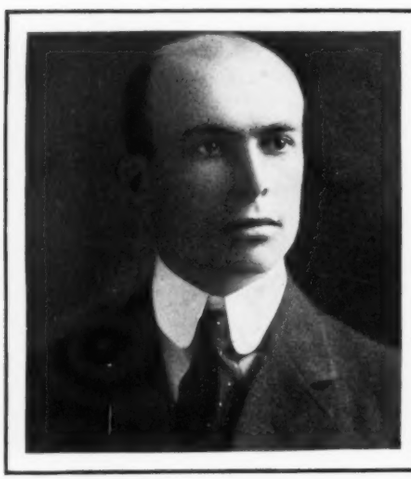
Assembling and Testing Room of the Interstate Electric & Manufacturing Co.



Machine Shops of the Interstate Electric & Manufacturing Co.

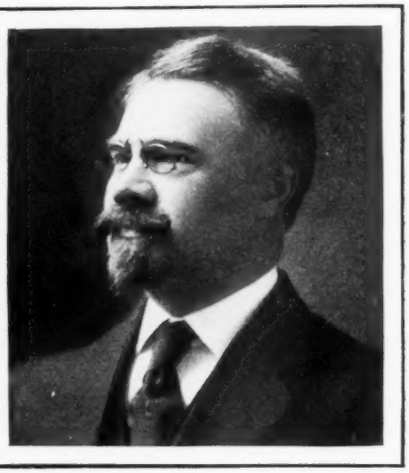
The new company was fortunate in securing the services of Mr. R. Hansen, a designer of long experience and a reputation for developing new apparatus of great efficiency and utility. Mr. Hansen was widely known throughout the telephone field through his previous connections with several of the largest independent telephone manufacturers.

The company's location is particularly advantageous as regards the trade of several prominent telephone states, notably, Iowa, Nebraska, North and South Dakota, Minnesota, Missouri, Kansas, Colorado, Wyoming and Montana. Sales of its improved apparatus, particularly the transmitter, has been made in almost every territory in the Union. Transmitters, ringers and magneto and common battery wall sets are the specialties of this firm. In the transmitter a departure is taken from the ordinary methods of construction. The microphone or carbon button is placed in front of the diaphragm and it is claimed that a packing effect is impossible. The officers of the company are: President, Max McGraw; vice-president, W. S. Warfield, Jr.; secretary-treasurer, R. P. Brown: superintendent, R. Hansen.



Mr. R. P. Brown.

Mr. Max McGraw.



Mr. R. Hansen.

Insulated Nails for Installing Instrument Wire.

The Eureka Supply Company, 132 Federal street, Camden, N. J., is distributing a neat folder illustrating Eureka products. The Eureka fibre insulator used for holding instrument wire in place, made with either flat or round head, is a nail ¾ in. or 1 in. long. This nail passes through two fibre washers or discs separated and held in place by a hard rubber bushing about ⅛ in, or ¼ in. long through which the nail passes. The wire is slipped over the top washer and placed close to the nail between the two washers and the nail is then driven in until the wire is securely fastened. The nails are made in different sizes and the fibre is either black or gray.

The Eureka insulated nail is made similar to the insulator but has one washer and bushing. As the nail is driven in the wood, the rubber bushing bulges separating the wire and giving additional insulation at the nail. In the Eureka nail, a fibre disc or washer only is used fitting close to the head of the nail. The nail is insulated by dipping in an insulating substance. The nail is also furnished in the double type forming a type of staple and is used for separating and staying single wire.

It would appear that much time and money could be saved by the use of these nails and insulators both in first cost and in installing work.

Condensed News Reports

Officers of companies are earnestly requested to forward us promptly all financial and other statements as soon as issued and any items of interest as to their plants and systems

PERSONAL.

MR. C. L. WAIT has assumed the duties of manager of the People's Telephone Company at Chillicothe, Mo.

MR. E. W. ROUSH has been elected manager of the Fremont Home Telephone Company's exchange at Lindsey, Ohio.

MR. B. WARREN has been appointed manager of the exchange of the Missouri and Kansas Telephone Company at Pleasant Hill, Mo.

MR. R. L. TALLEY of Rockdale, Texas, has been appointed manager of the Southwestern Telegraph and Telephone Company's exchange at Taylor, Texas.

MR. R. WEDMAN of Grand Forks, N. D., has been appointed manager of the Fox River Valley Telephone and Telegraph Company's exchange at Green Bay, Wis.

MR. W. T. WALKER has been transferred from Taylor,Texas, to the managership of the Southwestern Telegraph & Telephone Company's exchange at Lampassas, Tex.

MR. T. C. CROCKER, formerly of the Automatic Electric Company, Chicago, Ill., has taken the position of superintendent of equipment with the Home Telephone Company, Dayton, Ohio.

MR. WILLIAM E. KEILY has resigned his position as managing editor of the Western Electrician, following the change in ownership of that paper and its consolidation with the Electrical Review. Mr. Keily's connection with the old paper ceased with its last issue, dated Oct. 31. He had been identified with the editorial conduct of the paper for a number of years, having been managing editor since 1899. During this time Mr. Keily made many friends and acquaintances in the electrical field, and he won their respect and esteem by his character and ability. A journalist by profession, with experience in both the general and technical fields, Mr. Keily plans to engage in literary work at his home in Chicago. He is an associate member of the American Institute of Electrical Engineers, member of the National Geographic Society and also of the Illuminating Engineering Society and the Electric Club of Chicago. He will have the hearty good wishes of the many persons who are acquainted with him, and familiar with the good work which he has done.

NEW COMPANIES.

PARADISE, ARK.—The Paradise and Raymond City Telephone Company has been incorporated with a capital of $20,000.

GOSHEN, GA.—The Goshen Telephone Company has filed articles of incorporation. The capital stock is placed at $700 and the incorporators are: A. W. Burch, B. H. Dunaway, J. B. Cullars, E. E. Brown, J. M. Ivey, E. H. Albea, T. J. Leverett, G. A. Norman and J. O. Caldwell.

OCOYA, ILL.—The Pike Township Telephone Company has been incorporated with a capital stock of $3,900. The incorporators are: C. V. Richardson, Fred Fisher and J. H. Balbach.

ELWOOD, IND.—The farmers in this vicinity have organized a telephone company and have started constructing lines. The switchboard will be located at Perkinsville. The officers are Charles Harvey, of Elwood, president, and F. E. Haworth, secretary.

GREEN RIDGE, MO.—The Green Ridge Telephone Company has been incorporated with a capital stock of $2,000. The incorporators are: E. B. Helman, W. A. Sanders, W. T. Brir.. and others.

CLARKSON, NEB.—The Western Star Telephone Company has been chartered with a capital of $600 by Anton Rusicka and Ed. Cimfel.

HOMER, NEB.—The Farmers' Telephone Company was recently organized in this place. The officers are: President, Chris Eriksen; secretary, Will Blessing; treasurer, Louis Knudson. Directors: Carl Fredericksen, August Wilkins and George Jensen.

JACKSONVILLE, N. C.—The Onslow Telephone Company has been incorporated with a capital stock of $20,000 by E. L. Cox and others.

HARRISVILLE, OHIO.—A new telephone company was recently organized here with John Seebert as chairman and Walter Toland, secretary. The company will be known as the People's Telephone Company.

PRINEVILLE, ORE.—The McKay Creek Telephone Company has been organized in this place. The officers are: R. M. Powell, president; J. T. Moore, vice-president, and J. A. Seabury, secretary-treasurer. Directors: R. M. Fowell, I. W. Spear and M. D. Powell.

HARRISBURG, PA.—The Nittany Telephone Company of Bellefonte has been incorporated with a capital of $5,000. N. E. Robb of Harrisburg is secretary-treasurer.

HARRISBURG, PA.—The Mahoning Rural Telephone Company of Wehr, Schuylkill county, has been incorporated with a capital stock of $5,000. Jacob Zehner is treasurer.

IRWIN, PA.—The Farmers' Interurban Telephone Company, composed of a number of the leading farmers of this vicinity, has been organized for the purpose of putting up a line that will extend from Irwin to Arona, the terminus. The officers are: President, George W. Painter; vice-president, Edward Whitehead; secretary, Dr. W. H. Taylor; treasurer, L. B. Gongaware.

READING, PA.—The Mt. Zion Rural Telephone Company has been organized by farmers and business men of Mt. Zion. The line will cover a territory of twenty miles, including Mt. Aetna, Frystown and other points. It will also connect with Lebanon.

BURNS, TENN.—A Home telephone company is being organized in this place, which expects to cover the county in its operations. A. L. M. Johnson and A. D. Clark are pushing the movement and have already commenced to build the lines, which will be extended all over the county, with exchanges placed at the various convenient locations.

AUSTIN, TEX.—The Mercedes Telephone Company, of Mercedes, has been incorporated with a capital stock of $1,000. The incorporators are W. S. Chaplin, A. E. Chapman, W. J. DeForce and others.

WHEELING, W. VA.—A charter has been granted to the Long Distance Telephone & Telegraph Company of New York and West Virginia. The incorporators are John A. Howard, S. W. Harper, A. S. List, J. L. Dickey and W. C. Handlan, all of Wheeling.

BUENA VISTA, WIS.—The Buena Vista Telephone Company has been incorporated with a capital stock of $2,400. The incorporators are: L. A. Prescourt, L. Prescourt, S. E. Carley and Andrew Yokers

HARTFORD, WIS.—A co-operative telephone company is being organized by farmers living between Hartford and Hullsburg, Washington county.

CANNINGTON MANOR, SASK., CAN.—A rural telephone company is being formed here to construct a telephone system for the benefit of the farmers living in the vicinity of this town. G. D. Dickin, of Manor, Sask., is interested in the project.

LONDON, ONT., CAN.—The Mount Forest, Wellington & Gray Telephone Company, of Mount Forest, has been incorporated with a capital stock of $10,000.

FINANCIAL.

ARCOLA, ILL.—The Arcola Grain, Coal & Telephone Company has increased its capital stock from $8,000 to $11,000.

RUSSELL, MAN., CAN.—The capital stock of the Russell Telephone Company has been increased from $5,000 to $25,000, to allow the construction of a number of extensions.

FRANCHISES.

BISHOP, CAL.—The Owens Lake Telephone Company has applied to the board of supervisors for a franchise to erect a telephone system.

AUDUBON, IA.—The Audubon County Telephone Company was granted a franchise by a recent vote of the people.

SWANVILLE, MINN.—A franchise has been granted to the Elmdale Rural Telephone Company.

COLUMBIA, MO.—The city council is considering granting a telephone franchise to J. W. Grain and others for construction of farm lines between Columbia and other points south.

DICKINSON, N. D.—The county board has granted a 50-year franchise to the Belfield & Northfield Telephone Company to erect a line in the western part of the county.

HETTINGER, N. D.—The Northern Telephone Company has applied for permission to construct a telephone line in Hettinger.

DAYTON, WASH.—J. H. Spartin and John Broyles have been granted a franchise to erect and maintain telephone lines in this county.

NORTH YAKIMA, WASH.—A franchise has been granted to W. F. Longmire for an Independent telephone line, which will connect North Yakima with the Selah and Wenas valleys and extend through them to the Kittitas county line connecting with a system there.

SEATTLE, WASH.—Eben Green and others have applied to the county commissioners for a franchise to use a portion of the highways in King county for the construction of telephone lines.

WATERFORD, ONT., CAN.—The council has passed a bylaw granting a franchise to the Norfolk Telephone Company.

CONSTRUCTION.

PHOENIX, ARIZ.—The Consolidated Telephone and Telegraph Company contemplates constructing a direct line from Phoenix to Mesa.

SACRAMENTO, CAL.—R. L. Swanson, manager of the Manton and other telephone lines, has secured a contract to extend the line on the Cone ranch to the Ellenwood sheep camp, a distance of about 20 miles. The line is to be partly new and partly rebuilt, and will be a metallic circuit throughout.

DELTA, COL.—The Delta County Co-Operative Telephone Company has just completed the construction of a double toll line between Delta and Hotchkiss.

CLAYTON, ILL.—The Mt. Sterling Telephone Company is arranging to extend and improve its service. A new and larger switchboard has been ordered.

MONMOUTH, ILL.—The Monmouth Telephone Company has just completed a thorough overhauling of its country lines running out of this city.

DANVILLE, ILL.—The Citizens' Telephone Company is installing a new switchboard at Indianola.

KEOKUK, IA.—The Mississippi Valley Telephone Company is erecting a large steel tower which will be 110 feet high, with concrete supports, for supporting the spans across the river.

LE MARS, IA.—The Plymouth County Telephone Company is building new lines in Marion township and extending lines to Grant and Washington townships.

SHENANDOAH, IA.—Many improvements are being made by the Mutual Telephone Company to its country lines.

WASHINGTON, IA.—The Washington Telephone Company has just completed a new toll line to Ainsworth.

WODEN, IA.—Work has been started by the Western Electric Telephone Company on the reconstruction of the telephone line from this place to Titonka.

MILTONVALE, KAN.—The Miltonvale Telephone Company is making many improvements to its lines. A line has been built to Ames and another to Aurora.

MOUND VALLEY, KAN.—The Mound Valley Telephone Company has installed an addition to its switchboard to accommodate increasing business.

COLUMBIA, KY.—The Columbia Telephone Company, H. N. Miller, manager, is now building a through line from here to Gradyville.

BOVEY, MINN.—The Masaba Telephone Company will soon open an exchange at this place.

COMARANT, MINN.—A new telephone line has been constructed to this city from Rollag.

DULUTH, MINN.—A large crew of men is employed by the Duluth Telephone Company, substituting cable for the open wires. About 15,000 feet of cable will be laid.

EFFINGTON, MINN. (R. F. D. from Parkers Prairie).—At a mass meeting of the farmers in this vicinity it was decided to extend the telephone line in a southerly direction.

ELK RIVER, MINN.—A new telephone line is soon to be constructed to Burns.

EMILY, MINN.—There is agitation in this city for the construction of a telephone line extending from Emily to Pine River.

GILBERT, MINN.—A telephone exchange will soon be established at this place.

HANOVER, MINN.—The Hanover & Burschville Telephone Company was recently organized and will make connections with those towns and Loretta. The line is being run east on the Buffalo road and will extend as far as Lake Charlotte. The exchange will be in Hanover.

HUTCHINSON, MINN.—Work has been completed by the Hutchinson Telephone Company on its lines to Silver Lake.

LAPORTE, MINN.—A telephone exchange is soon to be established at this place.

LITTLE ROCK, MINN. (R. F. D. from Rushmore).—The Little Rock Farmers' Telephone Company's line will soon be in operation.

LONG PRAIRIE, MINN.—The Sauk Valley Telephone Company contemplates extending its telephone system to Long Prairie, Minn.

MAPLETON, MINN.—Extensive improvements will be made to the telephone exchange in this city.

ST. JAMES, MINN.—Three or four farmers' lines are being constructed to South Branch township by the St. James Telephone Company.

ST. PAUL, MINN.—A telephone line from Wannaska through Maling to Roseau has recently been completed.

THIEF RIVER FALLS, MINN.—Many improvements will be made to the telephone system operating in this city.

MEMPHIS, MO.—The Memphis Telephone Company is preparing to build a line south of town to accommodate the south part of the county.

MEMPHIS, MO.—The Downing Telephone Company is rebuilding the entire exchange. It has recently installed a new switchboard and has the poles and messenger wires up for stringing about 2,000 ft. of cable.

MILES CITY, MONT.—The Independent telephone company intends to install its system in this city as soon as possible. The system is already constructed as far as Roundup.

UNIVERSITY PLACE, NEB.—The directors of the University Place Telephone Company are considering important extension matters.

DICKINSON, N. D.—The Board of Counnty Commissioners has granted a 50-year franchise to the Belfield & Northwestern Telephone Company to erect a telephone system in the western part of Stark county.

MOUNTAIN, N. D.—It has been decided to install an exchange in this place to be operated by the Edinburg & Gardar Telephone Company.

TOLNA, N. D.—Work on the construction of the new lines out from Tolna will begin soon.

BEND, ORE.—The forest service has begun the construction of a telephone line from Sisters to the Allingham ranch, on the Matoles, a distance of about 18 miles. The line will be completed in about two months, when connection will immediately be made with the Pioneer Telegraph & Telephone Company's line at Sisters. This will give long-distance service to the ranchers living along the Matoles.

FLORENCE, ORE.—The Coast Line Telephone Company has opened for business a line extending from Florence to Gardiner, which will also connect with the Eugene lines.

CLAYSVILLE, PA.—The National Telephone Company has completed the work of rebuilding its plant in this place.

MERCER, PA.—The Plain Grove Telephone Company has completed a toll line from its exchange at Volant to the Mercer exchange of the American Union Telephone Company.

COLUBIA, S. D.—The Groton-Ferney Telephone Company has nearly completed the work of rewiring the town.

CORSICA, S. D.—The Farmers' Co-operative Telephone Company, with headquarters at New Holland, will soon have a line from this place to Joubert in operation.

HARRISON, S. D.—The system of the Farmers Co-operative Telephone Company is nearly completed.

PHILLIP, S. D.—The Great Western Telephone Company has completed arrangements for constructing a line to Hardingrove and also several extensions from the main line. The new line and extensions will prove of great benefit to numerous ranchers and homesteaders.

WESTERN, S. D.—The farmers' telephone line at this place is almost completed.

BRADY, TEXAS.—The contract for rebuilding the outside plant and installing a new common battery switchboard with present equipment for 500 lines, has been awarded by the Independent Telephone Company to Knapp and Marrs, telephone engineers, of Dallas, Texas. Work was started this week upon an all-cable, multiple tap distribution system, which will represent the best ideas of modern practice.

PETERSBURG, VA.—At a recent meeting of the stockholders of the Dinwiddie Telephone Company it was determined to extend the lines of the company from DeWitt, Dinwiddie county, to Lawrenceville, Brunswick county. The wires will be run into the exchange of the Mutual Telephone Company at Lawrenceville. The work of extension will be begun at once.

HUNTINGTON, W. VA.—The Huntington Mutual Telephone Company has decided to construct an entire new plant in this place. A new fireproof building will be erected and all wires and cables will be laid underground.

COLFAX, WIS.—Oscar Anderson, proprietor of the telephone line operating at this place, is extending his line to the vicinity of Wheeler.

DORCHESTER, WIS.—Lapp and Sturner will extend their telephone lines to the north and west of this place.

MADISON, WIS.—The State Board of Control, M. J. Tappins, secretary, is having specifications prepared for a switchboard and apparatus for the new exchange to be installed in the Wisconsin State Prison at Waupun, of which J. M. Towne is warden. The contract will be awarded in about three weeks' time.

MILLTOWN, WIS.—The new telephone line is nearly completed in South Milltown.

SHAW, WIS. (R. F. D. from Eleva)—Several new lines are being erected by the Shaw Telephone Company.

SOUTH WAYNE, WIS.—The South Wayne Telephone Company is preparing to install a new switchboard.

TRADE LAKE, WIS.—Work has been started by the Farmers' Telephone Company on the construction of its lines in this township.

PINEDALE, WYO.—The government telephone line from this place over Union Pass to Sheridan Creek station, in the Boneville national forest, a distance of 70 miles, has been completed and is in operation.

OXBOW, SASK., CAN.—The Oxbow Telephone & Lighting Company announces that it will at once extend its system.

VANCOUVER, B. C., CAN.—The British Columbia Telephone Company is arranging to construct a new telephone line from Nanaimo to Cumberland, Comox, Union and other points.

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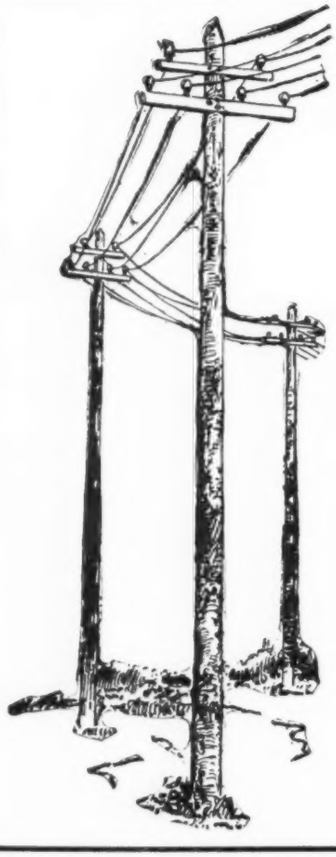

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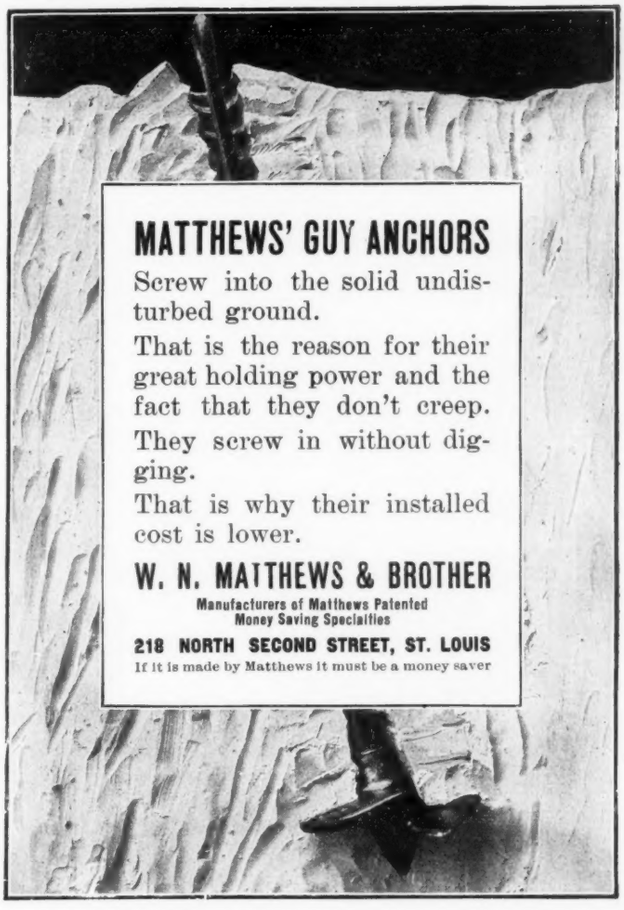

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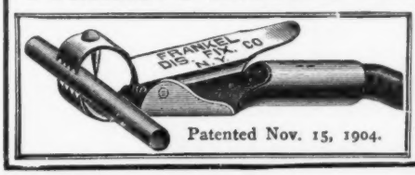

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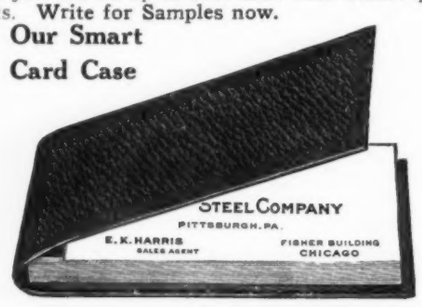

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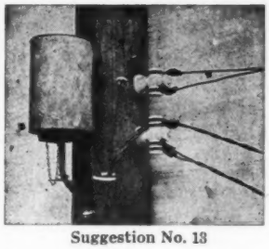
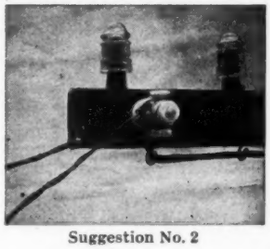


Suggestion No. 13



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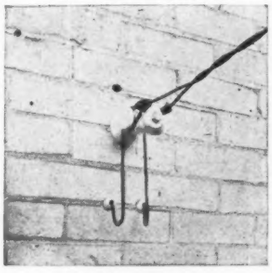

Suggestion No. 5

Suggestion No. 8

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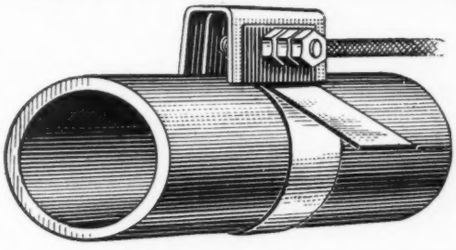

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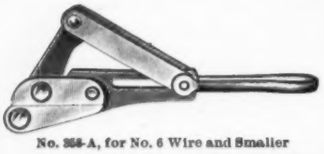

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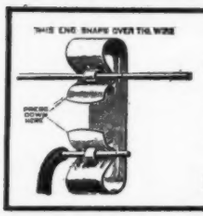

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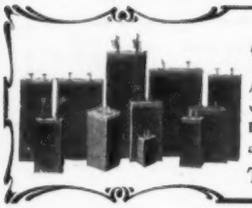

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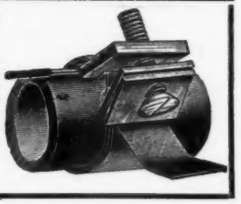

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